HITACHI SR1050D

MODEL

SERVICE MANUAL

CONTENTS

OUTLINE SPECIFICATION **4**
PIN DESIGNATIONS FOR SCART CONNECTORS **5**
INSTALLATION **6**
Connecting to a TV Using Coaxial Cable 6
Connecting to a TV and a VCR Using Coaxial Cable 6
Connecting to a TV and VCR Using SCART Leads 7
Connecting an External Decoder 7
Connecting an External Receiver 7
Connecting a Compatible Dish Positioner 7
Connecting Stereo Equipment 8
FRONT PANEL OPERATION **8**
QUICK START INSTRUCTIONS **9**
SWITCHING ON AND OFF 9
UHF TUNING 9
Tuning In to a Channel 9
Using Channel Scan to Tune In to a Channel 9
Fine Tuning a Channel 9
Storing the UHF Tuning Information 9
HANDSET OVERVIEW **10**
Selecting Programmes 10
Recalling the Previous Programme 10
Keys Used in Menus 10
Function Mode 11
Other Key Operations 11
Changing the Batteries 11
MENU STRUCTURE **12**
SUMMARY OF MENU VALUES **13**
Sleep Timer Menu 13
Timer Menu 13
Tuning Menu 13
Audio Menu 13
External Decoder Menu 13
LNB Install Menu 13
Contrast Menu 13
Background Colour Menu 13
IMPORTANT OPERATIONS **14**
LNB Install Menu 14
Tuning Menu 14
Displaying a Programme Immediately on Power On 15
Download Menu 15
Resetting Factory Defaults 15
Cancelling a Plain Coloured Screen 15
HANDLING ELECTROSTATIC SENSITIVE (ES) DEVICES **16**
WORKING WITH CHIP COMPONENTS **16**
General Precautions for Handling and Storing Chips 16
General Precautions for Attaching and Removing Chips 16
Removing a Chip 16
Attaching a Chip 16
GAINING ACCESS TO THE UNIT **17**
REMEMBER - SAFETY FIRST 17
Removing the Cover 17
Removing the Front Panel 17
Removing the Main PCB 17
Re-assembling the Unit 17
MAIN BLOCK DIAGRAM **18**
CIRCUIT DESCRIPTION **19**
TUNER AND VIDEO PROCESSING 19
Tuner 19
Baseband Amplifier 19
Video Processing within U9 20
Video Filter and Phase Compensation 20
Amplifier and Sound Trap 20
Energy Dispersal Clamp 20
Sync. Separators 20
Colour Graphics Generator 20
UHF MODULATOR 21
CONTROL CIRCUITRY 22

AUDIO PROCESSING 22
Local Oscillator, Mixer and Demodulator 22
Low Pass Filter 22
50 µs De-emphasis 22
PANDA Noise Reduction System and De-emphasis 23
Audio Mode and Source Selection 23
VIDEO AND AUDIO SIGNAL ROUTING 23
SWITCH MODE POWER SUPPLY 24
Mains Input and Rectification 24
SMPS Controller U1 24
Circuitry on Secondary Side of T2 24
VIDEOCRYPT BLOCK DIAGRAM 26
VIDEOCRYPT CIRCUIT DESCRIPTION 26
CIRCUIT DIAGRAM C (VIDEOCRYPT) 27
GRID REFERENCES - CIRCUIT DIAGRAM C 27
MAIN BOARD OSCILLOGRAMS 29
GRID REFERENCES - CIRCUIT DIAGRAM A 36
CIRCUIT DIAGRAM A (TUNER, VIDEO ETC.) 37
CIRCUIT DIAGRAM B (AUDIO, SMPS ETC.) 38
GRID REFERENCES - CIRCUIT DIAGRAM B 39
GRID REFERENCES - MAIN PCB 40
MAIN PRINTED CIRCUIT BOARD (COPPER SIDE) 41
MAIN PRINTED CIRCUIT BOARD (COMPONENT SIDE) ... 42
SPARES - PARTS LIST 43
MODEL-SPECIFIC INFORMATION 51
LATE CHANGES 52/51

IMPORTANT

NOTE 1: STATUS OF THE PRODUCT

This service manual covers both the single and dual LNB input versions of the satellite receiver with integral VideoCrypt decoder. The name and numbers of the receivers are given on the front cover.

This main PCB described in this manual is at Revision A5. The PCB's part number is marked on the component side of the PCB. This number can be read in area D1 of the component ident diagram in this manual, where revision A5 is denoted by the characters 105 at the end of the part number.

Some of the main PCBs in units in the field may be at Revision A3; this is similar to A5 but several components which were retrofitted in A3 are fully incorporated in A5.

At the time this manual goes to print, a B1 version of the main PCB is being prepared. Full details of this will be given in the next issue of this manual. The B1 version does not, however, vary much from the A5 version - some components will move slightly and the components presently retrofitted will be fully incorporated.

This manual includes information from all Engineering Change Orders (ECOs) up to and including ECO S000026 provided that these ECOs had an effectivity date on or before 23.09.92. All ECOs before ECO S000026 which had an effectivity date after 23.09.92 are not included in the main pages of this manual but may be included in the Late Changes section (see below).

Information on any further changes will be available as technical bulletins until this manual is re-issued. This manual also includes a Late Changes section (inside the rear cover of the manual) where details of any late changes, made directly before printing the covers, are included.

NOTE 2: LARGE CIRCUIT DIAGRAM

As well as the three separate circuit diagrams relating to specific areas of the complete circuit, this manual also contains an A2 sized circuit diagram of all circuitry except the VideoCrypt circuitry. This A2 diagram is attached near the centre of the manual (just before the VideoCrypt information) so that it can be easily detached if you wish.

NOTE 3: VIDEOCRYPT CIRCUIT DESCRIPTION AND DIAGRAM

For copyright reasons, these have been printed on special paper, part of which has been overprinted with broad diagonal stripes to prevent photocopying. Each of these sheets has a unique, traceable serial number.

OUTLINE SPECIFICATION

GENERAL

Number of Programmes (single input receiver)	120
Number of Programmes (dual input receiver)	199
Front Panel Indicators	3-character, 7-segment display for Standby, Timer and Programme/Channel No.
Front Panel Control Buttons	Standby, Programme Up, Programme Down, Authorise
UHF Modulator	CCIR System I, Ch. 21 to 69, preset to Ch. 38
Operating Voltage	198 - 264 V AC, 50 Hz
Power Consumption	35 W (max.)
Dimensions	H = 66 mm, W = 360 mm, D = 210 mm
Weight	2.5 kg (typical, when packed)

CONNECTORS

TV	SCART (RGB and CVBS)
VCR	SCART (CVBS)
DECODER	SCART, Baseband Output, Audio/Video Input/Output, RGB in
AUDIO OUT	Phono (L and R)
MAINS INPUT	2-pin reversible
AERIAL	IEC female
TV	IEC male
LNB	Single or dual F-type

TUNER

Receiving Frequency Range	950 - 1750 MHz
Polarity Switching	Vertical 12.6 V (±0.5 V), Horizontal 17.2 V (±0.5 V) (250 mA load)
Input Impedance	75 Ω
I. F.	479.5 MHz
I. F. Bandwidth	27 MHz
Input Level	-60 dBm to -30 dBm
Image Rejection	40 dB (typically)
Static Threshold	6 dB (typically)
Energy Dispersion Removal	35 dB (min.)

SCART SOCKETS

Video Output Level	1 V p-p (±2 dB)
Video Output Impedance	75 Ω
Video Frequency Range	25 Hz - 4.8 MHz (±1.5 dB)
Video De-emphasis (PAL)	to CCIR 405.1 (625 lines)
Baseband Output Level	1 V p-p (±2 dB)
Baseband Frequency Range	25 Hz - 10.5 MHz (±1.5 dB)
Baseband De-emphasis	PAL/MAC, software selectable
Audio Frequency Range	30 Hz - 15 kHz
Audio Output Level	500 mV rms into 600 Ω

OPERATING/STORAGE CONDITIONS

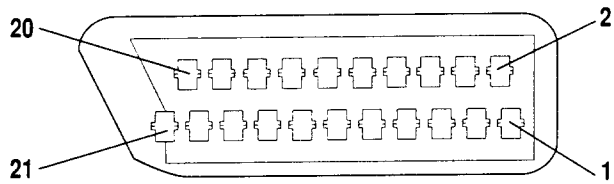
Operating Temperature Range	5 - 40 °C
Operating Humidity Range	20 - 80% non-condensing at 25 °C
Storage Temperature Range	-20 - +50 °C
Storage Humidity Range	10 - 90% non-condensing at 25 °C

AUDIO SPECIFICATION

Audio Bandwidth	150 kHz narrow band (mono de-emphasis PANDA 1 or 50 µs)	
Tuning Frequency Range	5.00 - 9.00 MHz in 10 kHz steps	
Preset Stereo Subcarriers	Stereo A	7.02 & 7.20 MHz (PANDA 1)
	Stereo B	7.38 & 7.56 MHz "
	Stereo C	7.74 & 7.92 MHz "
	Stereo D	8.10 & 8.28 MHz "
Preset Mono Subcarriers	Mono 1	6.50 MHz (50 µs)
	Mono 2	7.02 MHz (PANDA 1)
	Mono 3	7.20 MHz "
	Mono 4	7.38 MHz "
	Mono 5	7.56 MHz "
	Mono 6	7.74 MHz "
	Mono 7	7.92 MHz "
	Mono 8	8.10 MHz "
	Mono 9	8.28 MHz "

PIN DESIGNATIONS FOR SCART CONNECTORS

Socket Viewed from Rear Panel



PIN	DECODER SCART	TV SCART	VCR SCART
1	R Audio Out	R Audio Out	R Audio Out
2	R Audio In	N/C	R Audio In
3	L Audio Out	L Audio Out	L Audio Out
4	Audio Ground	Audio Ground	Audio Ground
5	Blue Ground	Blue Ground	Ground
6	L Audio In	N/C	L Audio In
7	Blue In	Blue Out	N/C
8	Ext. Decoder Status In	AV Status Out	AV Status In
9	Green Ground	Green Ground	Ground
10	N/C	N/C	N/C
11	Green In	Green Out	N/C
12	Serial Data I/O Port	N/C	N/C
13	Red Ground	Red Ground	Ground
14	N/C	N/C	N/C
15	Red In	Red Out/SVHS Chroma	SVHS Chroma
16	RGB Status In	RGB Status Out	N/C
17	Video Ground	Video Ground	Video Ground
18	Ground	Ground	Ground
19	Baseband Video Out	Video Out	Video Out
20	Video In	N/C	Video In
21	Ground (Casing)	Ground (Casing)	Ground (Casing)

Service Manual

INSTALLATION

Important:

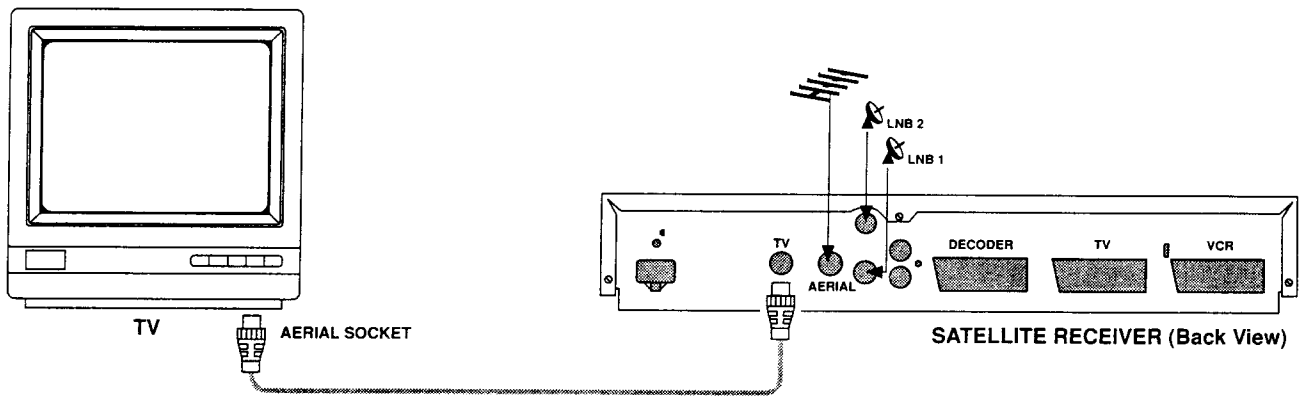
- Do not turn on the power to your receiver, TV, VCR etc. until you have made the necessary cable interconnections.
- If you want to connect a SMATV communal aerial, connect it to the LNB 1 connector of a dual input receiver; you should not connect it to a single input receiver, as on this type of receiver you cannot turn off the LNB 1 power.
- These instructions and diagrams show the UHF (TV) aerial connected to the receiver (i.e. looped-through the receiver). If you install it in this way, you should put the receiver into standby, rather than power it off, when it is not in use, otherwise you will not be able to view terrestrial TV programmes.
- You can connect the UHF aerial directly to the TV or VCR if you connect your TV to your receiver using a SCART lead.
- When you have carried out one of the installation schemes described below, refer to the Install Menu and specifically its sub-menus the UHF Tuning Menu and the LNB Install Menu. The Tuning Menu in the Programme Setup Menu contains a frequency scan option which can be used to help in the positioning of the dish aerial.
- If the receiver is connected to the TV/VCR using coaxial cable, stereo sound will not be available from your TV.
- If there is a short-circuit in the cable which connects the LNB to your receiver, the receiver will not work and may generate clicking noises.

Connecting to a TV Using Coaxial Cable

Connect the cable(s) from the dish aerial(s) to the LNB socket(s) on the rear panel of the receiver.

Connect the UHF (TV) aerial to the AERIAL socket on the receiver.

Connect a coaxial cable from the TV socket on the receiver to the aerial socket on your TV.



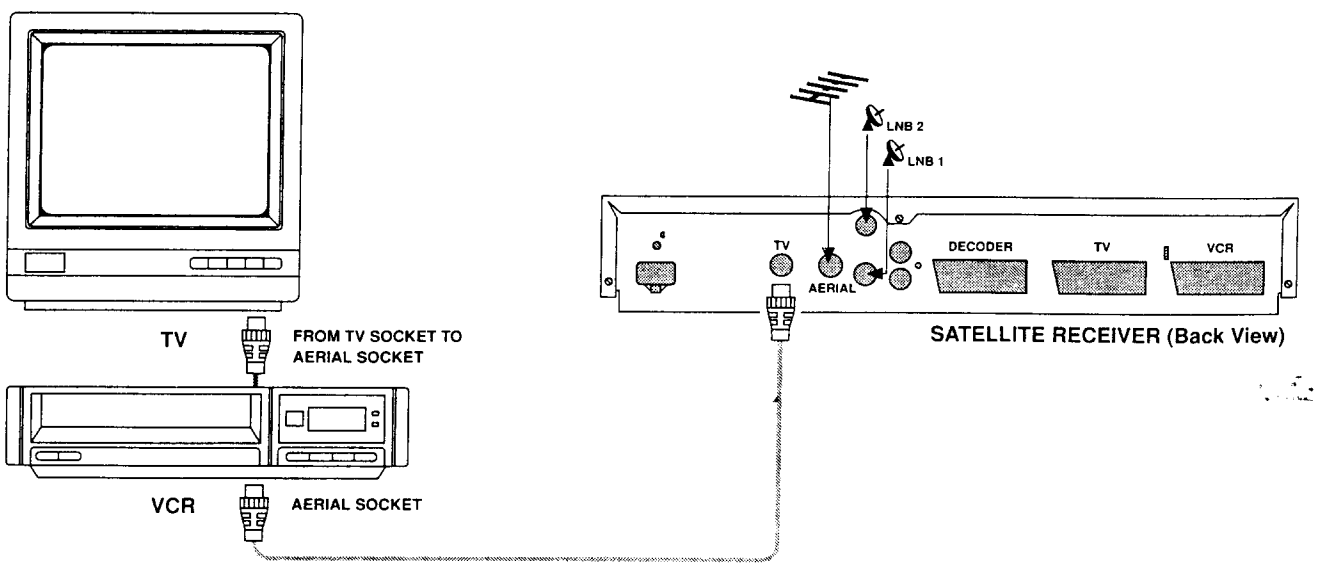
Connecting to a TV and a VCR Using Coaxial Cable

Connect the cable(s) from the dish aerial(s) to the LNB socket(s) on the rear panel of the receiver.

Connect the UHF (TV) aerial to the AERIAL socket on the receiver.

Connect a coaxial cable from the TV socket on the receiver to the aerial socket on your VCR.

Connect a coaxial cable from the TV socket on your VCR to the aerial socket on your TV.



Service Manual

Connecting to a TV and VCR Using SCART Leads

Connect the cable(s) from the dish aerial(s) to the LNB socket(s) on the rear panel of the receiver.

Connect the UHF (TV) aerial either by looping it through the receiver and VCR (as shown on the previous page) or by connecting it to the TV or VCR directly (as shown below).

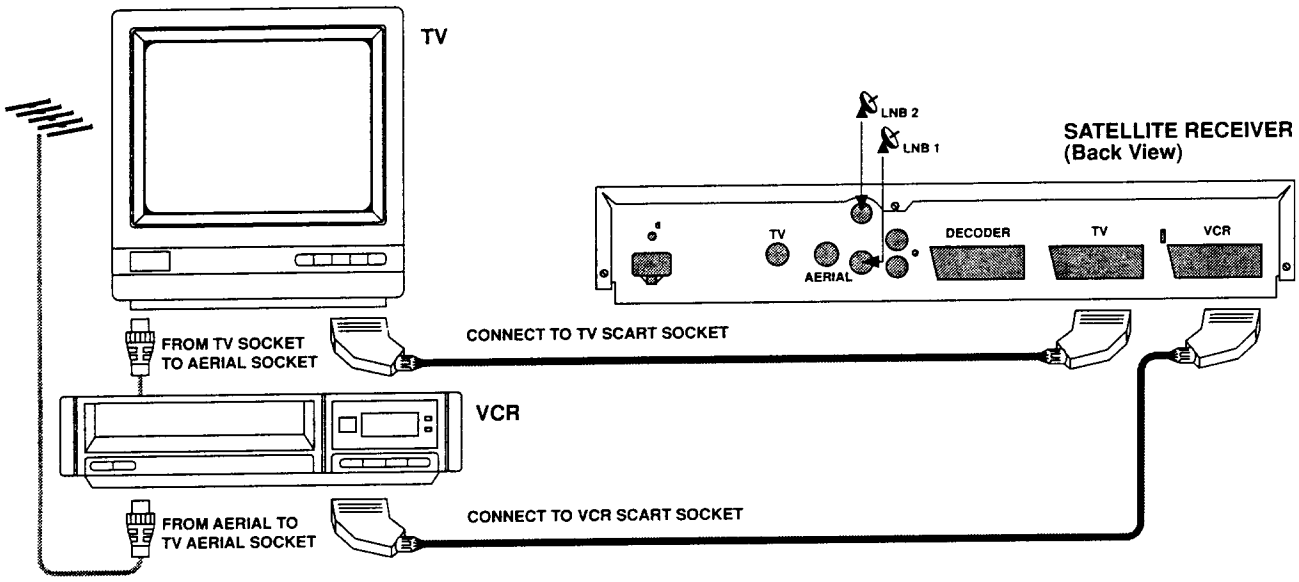
Connect a SCART lead from the TV SCART connector on your receiver to the SCART connector on your TV.

Connect a SCART lead from the VCR SCART connector on your receiver to the SCART connector on your VCR.

NOTE: If you have connected your TV using a SCART lead, then you can use the TV/SAT key on your handset to switch between terrestrial and satellite reception, providing your TV recognises pin 8 of the SCART socket.

NOTE: If you have connected your VCR using a SCART lead, to record from the receiver you will need to select AUX or AV on the VCR as the programme to record. When replaying the VCR through the receiver, you will need to switch the receiver to standby mode or select TV using the TV/SAT key; this method of replaying is, however, only possible if the TV is also connected using a SCART lead.

NOTE: When you are using the timer function (see the Timer Menu), pin 8 of the receiver's TV SCART connector will not force the TV into AUX mode. Therefore to watch the programme while you are recording it you either need to use the coaxial cable method of TV connection, or use a SCART connection and manually select AUX on the TV.



Connecting an External Decoder

This receiver has an integral decoder for viewing VideoCrypt transmissions, but you can also connect an external decoder to view transmissions which have been scrambled using a different system.

Connect the decoder to the receiver's DECODER SCART connector.

Refer to the External Decoder Menu under the Programme Setup Menu to set the baseband and the audio and video source for each programme you receive via the external decoder. If the decoder does not recognise pin 8 of the DECODER SCART, then you need to set up the audio and video source to be external.

Connecting an External Receiver

Instead of an external decoder, you can connect an external receiver to your receiver's DECODER SCART socket. For example, you might want to connect a MAC receiver so that you can view MAC programmes (as the receivers are PAL receivers). You then press the AUX/0 key to provide an auxiliary programme via which you can view the programmes you set up at the external receiver. Pressing the AUX/0 key causes the external audio and video signals from this external receiver to be routed through to your TV.

Connecting a Compatible Dish Positioner

Connect the dish positioner to your receiver's DECODER SCART socket and refer to the Tuning Menu to set up the SATELLITE option on a per-programme basis.

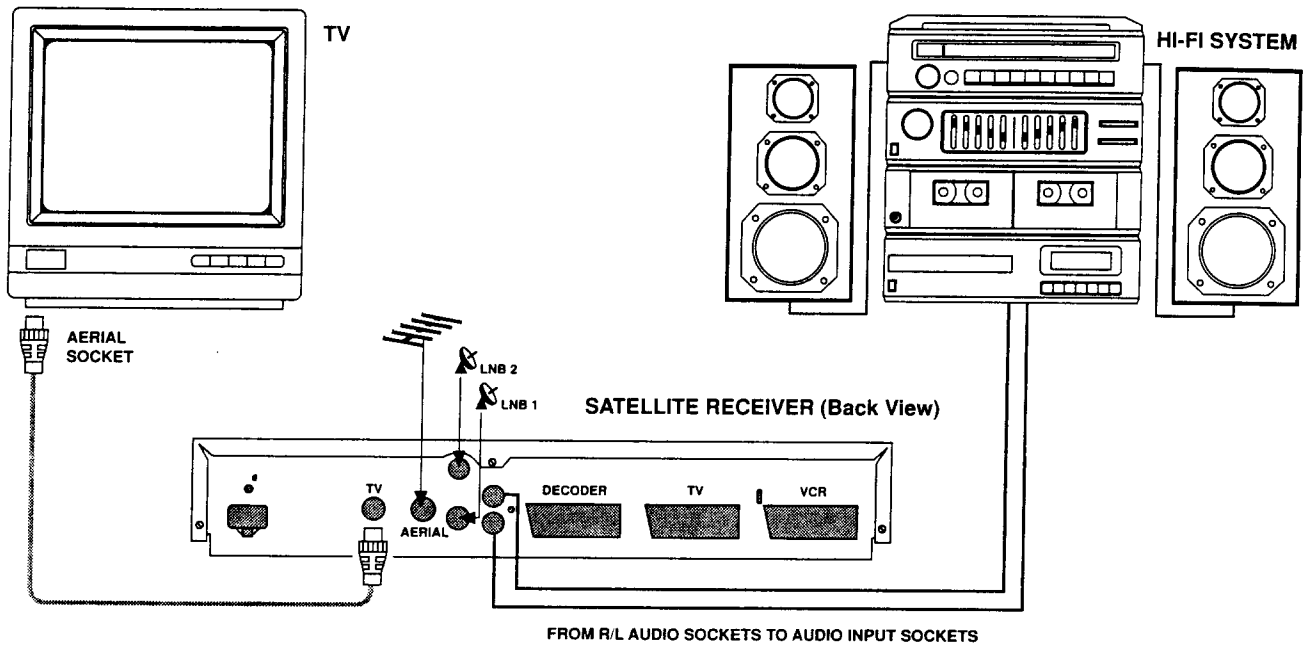
If you wish to connect an external decoder or receiver as well as the dish positioner, connect the dish positioner to your receiver's DECODER SCART socket and the external decoder/receiver to one of the decoder SCART sockets on the dish positioner.

Connecting Stereo Equipment

To obtain the maximum performance from your receiver, we recommend that you connect your receiver to a stereo TV or to a stereo amplifier (for example, in a hi-fi system).

To connect a stereo TV, connect your receiver to your TV (and VCR, if required) using a SCART lead, as described opposite, then select AV or AUX on your TV.

To connect to a stereo amplifier, firstly connect your receiver to your TV (and VCR, if required) using either a SCART lead or a coaxial cable, as described earlier in this section. Place the speakers either side of the TV and connect the phono leads from the AUDIO OUT sockets on your receiver to the appropriate audio input sockets on your amplifier. Switch your amplifier to Auxiliary Input.



FRONT PANEL OPERATION

The receiver is designed to be operated with your handset. Without it, you cannot display the menus or select options on them. You can, however, put the receiver in and out of standby mode by pressing the ⏻ button. You can also browse through the programmes, one at a time, by pressing the ▲ button (which increments the programme number by one) or the ▼ button (which decrements the number). The receivers also have a front panel "authorise" button (marked Ⓐ) for authorisation of programmes which may, in future, be transmitted on a pay-per-view basis.

QUICK START INSTRUCTIONS

You can operate this receiver very easily using a simple menu structure which you access by pressing the MENU key on the handset. The following instructions need to be followed when the receiver is being used for the first time.

SWITCHING ON AND OFF

The receiver will be in standby mode when you first power it on, unless it has been programmed to display a programme immediately (this is not recommended except for SMATV installations).

To bring it out of standby, press the ⏻ key or select a programme (see overleaf). To put the receiver back into standby, press the ⏻ key.

UHF TUNING

After the equipment has been installed, you will need to tune in your receiver to a particular TV channel if it is connected to the TV using coaxial cable. If it is connected using the SCART connector this will not be necessary.

To perform this UHF tuning, press the F key followed by the UHF (5) key to put the receiver into UHF tuning mode.

It is unlikely that you will be able to see the UHF Tuning Menu (shown right) on the screen initially, this will appear as tuning progresses. You will see a channel number, preceded by the letter C, on the front panel of the receiver.

The factory default is for the channel number to be set to 38. Channel 38 may, however, be assigned to something else (e.g. your VCR), in which case you must set your TV to a different channel number and adjust your receiver accordingly. The TV channel you choose must be one that is clear of any other broadcasting.

You can switch on a channel scan at the menu. This will save you having to set up the TV channel number; you can simply press the numeric key on your TV handset which you wish to assign to satellite programmes and then use the channel scan to tune into the channel represented by that TV handset key.

You can also fine tune at the menu, but this feature is not often required.

UHF TUNING MENU

CHANNEL 38

Press F then LEFT/RIGHT to start scan.

Press F then UHF for fine tune.

Tuning In to a Channel

Set your TV to the required channel number (in the range 21 to 69).

With the receiver in UHF tuning mode, key in this channel number using the numeric keys or use the ◀ or ▶ key to go through the channel numbers one at a time until a good quality picture of the UHF Tuning Menu can be seen on the screen.

NOTE: If you set your TV to channel 38, the menu would have appeared immediately.

Using Channel Scan to Tune In to a Channel

Press the numeric key on your TV handset which you wish to assign to satellite programmes (choose one that is free of any other broadcasting).

to use the ◀ or ▶ key if you did not stop the scan at exactly the correct channel to give the best picture.

Fine Tuning a Channel

At the UHF Tuning Menu, press the F key followed by the UHF (5) key.

A second option will appear on the menu, with its value flashing.

Press the ◀ or ▶ key to go through the values one at a time until the best quality background can be seen on the screen.

Fine tune can have any value between -15 and 15. As you fine tune, the value will also be displayed on the receiver's front panel.

UHF TUNING MENU

CHANNEL 38

FINE TUNE -5

Press F then LEFT/RIGHT to start scan.

Storing the UHF Tuning Information

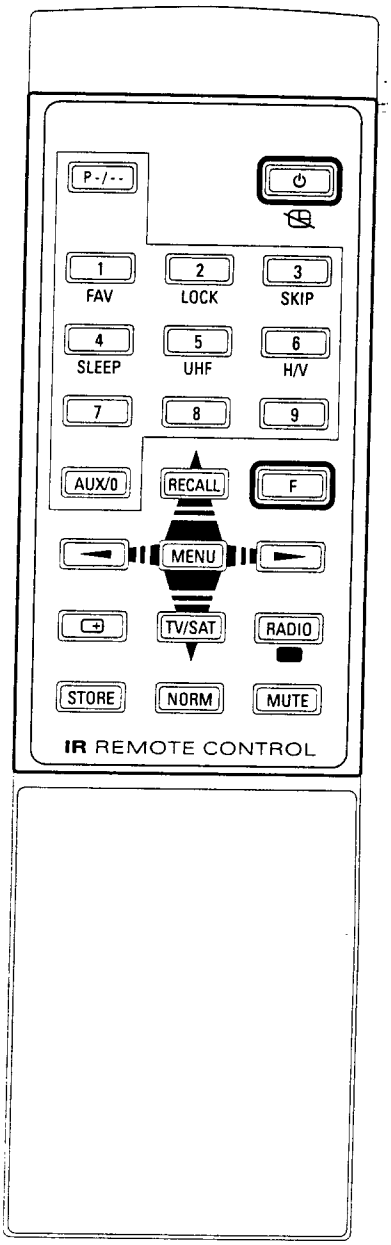
When you have set the required values for all of the options in the UHF Tuning Menu, press the STORE key.

Service Manuals

HANDSET OVERVIEW

The handset has a protective film on its top surface, around the keys. You can peel this off, if you wish.

The handset works by sending an infra-red beam to your receiver, therefore be sure to point it towards the infra-red receiver window on the front of the receiver. Do not place any objects which may block the beam between the window and the handset.



Selecting Programmes

You can browse through the programmes one at a time by pressing the ◄ or ► key. The ► key increments the programme number by one; the ◄ key decrements it by one.

When your receiver is new, it is in P- mode, which means you do not need to use the P-/-- key to select programmes 1 to 9. Select the programmes as follows:

Prog. No.	Operation
1 to 9	Press the relevant numeric key.
10 to 99	Press the P-/-- key then press the two relevant numeric keys.
over 100	Press the P-/-- key twice then press the two relevant numeric keys to complete the number.

When you press the P-/-- key you temporarily put the receiver into a different P mode which is shown on the screen as follows: P- or P-- or P1--. The dashes indicate how many numeric keys you need to press to display the required programme.

If you watch programmes mainly in the range 10 to 99, or mainly in the range over 100 you can go permanently into P-- or P1-- mode. This will save you having to press the P-/-- key to select these programmes. To change permanently to a different P mode, go temporarily into the required mode (by pressing the P-/-- key the required number of times) and then press the STORE key.

NOTE: If you are in P-- mode you can select programmes in the range 1 to 9 by putting a zero before the number. The 0 key is labelled AUX/0.

NOTE: In the menu options, irrespective of P mode, you can change programme numbers 1 to 9 using just the numeric key.

Recalling the Previous Programme

Press the RECALL key to restore the programme you were viewing before you selected your current programme. This key can therefore be used as a toggle to switch between two programmes.

Keys Used in Menus

MENU key:	used to enter the Main Menu i.e. display it on your TV screen; used to move back to the previous menu in the menu structure
0 - 9 keys:	used to move down to the next menu in the menu structure; if in one of the lowest menus, used to select an option in the menu; sometimes used to enter numerical values in the menu
▲ key:	used to move up through the options within a menu; *NOTE: The ▲ key is above the MENU key; it has the ▲ label above the key and the word RECALL on the key*
▼ key:	used to move down through the options within a menu; *NOTE: The ▼ key is below the MENU key; it has the ▼ label below the key and the word TV/SAT on the key*
◄ and ► keys:	used to select the values of each option in the menus;
F key:	used to start certain actions in the menus
NORM key:	used to leave a menu without storing any of the information you may have just altered in that menu; the receiver returns to normal viewing mode
STORE key:	used to store information you have just altered in a menu, so that this information becomes valid, and will be visible when that menu is re-entered

NOTE: The ▲, ▼, ◄ and ► keys all cause a "wrap" (e.g. pressing the ▼ key at the last option in a menu will select the first option, or if the possible values are 1, 2 and 3, and you keep pressing the ► key, 1, 2, 3, 1, 2....etc will be displayed).

Function Mode

F key: used to put the receiver into function mode; it has a blue border to show that those keys with blue coloured labels below them are valid in function mode

The following are the keys which are valid in function mode. When they are mentioned in the text, their blue label will be given first, with their normal key label given in brackets afterwards.

FAV key: used to show your list of favourite 10 programmes and to enter favourite programme mode

NOTE: This facility is not available for the single input receiver.

LOCK key: used as a quick method of locking programmes, as an alternative to using the Parental Lock Menu

SKIP key: used to skip a programme so that it is bypassed when you browse through the programmes using the ◀ and ▶ keys

SLEEP key: used to put the Sleep Timer Menu on screen; this is a useful way of switching off the receiver at a later time or as an instant record feature in conjunction with your VCR

UHF key: used to put the receiver into UHF tuning mode

H/V key: used as a rapid method of changing the polarity of a programme, as an alternative to using the Tuning Menu

■ key: used to put the receiver into radio mode and to give a blank screen

NOTE: This facility is not available for the single input receiver

key: used to cancel an event that has been set up in the Timer Menu, while the event is occurring

STORE key: used to store functions set up in function mode; also used to disable/enable the plain, coloured screen which results when a signal is too weak to give a picture

Other Key Operations

AUX key: used to select the auxiliary programme, via which programmes from an external receiver can be viewed

RECALL key: used to recall the last programme you were viewing

key: this is the status key, used to display, at the top of the screen, the status of the programme you are currently viewing

TV/SAT key: used to switch between terrestrial and satellite reception when the TV and receiver are connected using a SCART lead

RADIO key: used to select satellite radio channels; when pressed, the current audio mode is displayed; this mode can then be changed to any of the preset options, some of which may provide TV commentary in different languages, rather than radio channels.

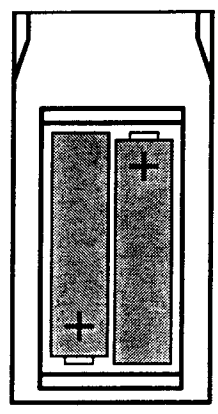
MUTE key: used to mute the sound (the word MUTE is displayed on screen); if the sound is muted, used to restore the sound to its previous level

Changing the Batteries

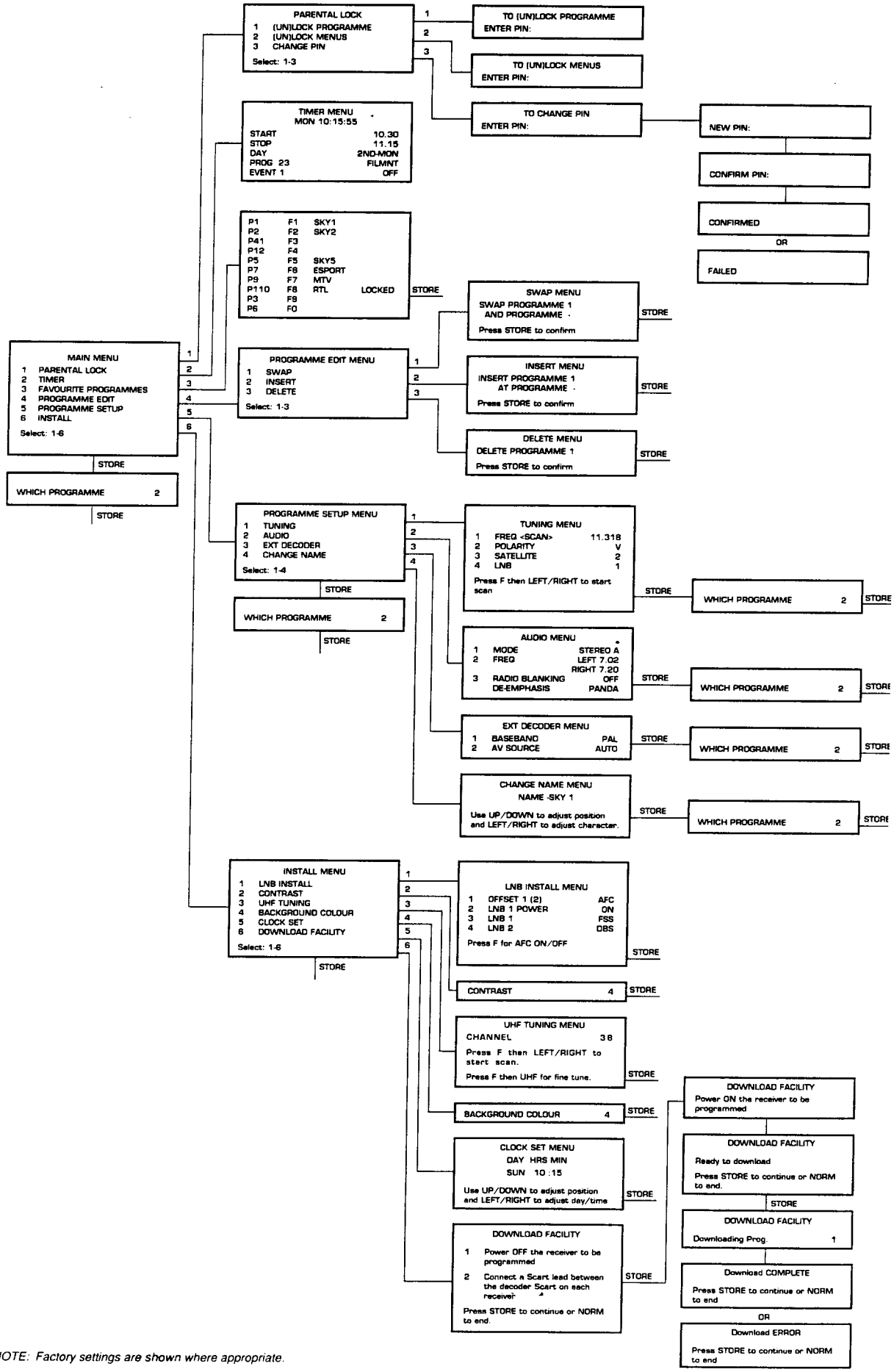
The handset runs from two AA batteries located under a cover on the underside of the handset. These batteries will need replacing from time to time. You should do this as soon as the handset fails to operate from the normal viewing distance.

Pressing down slightly on the ridged part of the battery cover, slide the cover in the direction marked ▼ OPEN. Remove the old batteries and put in the new ones in the orientation shown in the figure. Slide the cover back into position.

NOTE: Never leave flat batteries in the handset, as they may leak and corrode the metal contacts.



MENU STRUCTURE



NOTE: Factory settings are shown where appropriate.

SUMMARY OF MENU VALUES

Sleep Timer Menu

When the menu is entered, the time displayed is the receiver's current time plus 30 minutes. The sleep timer menu will be effective even if the receiver's clock has not been set to the correct time. Press tne F key to add multiples of 30 minutes to the stop time or use the ◀ or ▶ key to customise the stop time.

SLEEP TIMER MENU
SUN 00:25:24
STOP: 00:55
Press F to add 30 mins.
Press STORE to confirm.

Timer Menu

Start and Stop: any value (using numeric or ◀ and ▶ keys); 24-hr clock

Day: TODAY or day of the week and week (using ◀ and ▶ keys); week can have values 1ST, 2ND (also 3RD or 4TH for dual input receiver).

Prog: programme number up to 199 for dual input receiver or up to 120 for single input receiver; single input receiver will not show a programme name (they cannot be named).

Event: up to 8 for dual input receiver or up to 4 for single input receiver; can be ON or OFF (using ◀ or ▶ key).

TIMER MENU
MON 10:15:55

START	10.30
STOP	11.15
DAY	2ND-MON
PROG 23	FILMNT
EVENT 1	OFF

Tuning Menu

Freq: any value in the appropriate band (using numeric or ◀ and ▶ keys); the band is chosen at the LNB option of the LNB Install Menu.

Polarity: H or V (using ◀ or ▶ key or F followed by H/V key).

Satellite: any value in range 1 to 128 (using ◀ or ▶ key).

LNB: only present for dual input receiver and has value 1 or 2 (using ◀ or ▶ key).

TUNING MENU

1	FREQ <SCAN>	11.318
2	POLARITY	V
3	SATELLITE	2
4	LNB	1

Press F then LEFT/RIGHT to start scan

Audio Menu

Mode and Freq: see values listed in the specification at front of manual.

Customised frequency: any value between 5 MHz and 9 MHz (using numeric or ◀ and ▶ keys).

Radio Blanking: only present for dual input receiver and has value ON or OFF (using ◀ or ▶ key).

De-emphasis: can only be changed for mono modes and can have value PANDA or 50 µs.

AUDIO MENU

1	MODE	STEREO A
2	FREQ	LEFT 7.02
		RIGHT 7.20
3	RADIO BLANKING	OFF
	DE-EMPHASIS	PANDA

External Decoder Menu

Baseband: value PAL or MAC (using ◀ or ▶ key).

AV Source: any of the values AUTO, EXT-V or EXT-AV (using ◀ or ▶ key).

EXT DECODER MENU

1	BASEBAND	PAL
2	AV SOURCE	AUTO

LNB Install Menu

Offset: default value AFC; this can be turned off (using F key) and a value between -15 and 15 can be set if required (using ◀ or ▶ key). For dual input receivers a programme from each LNB is chosen to set OFFSET 1 then OFFSET 2.

LNB 1 Power: only present for dual input receivers and can be ON or OFF (using ◀ or ▶ key).

LNB: value can be FSS, DBS or T-COM band (using ◀ or ▶ key); for dual input receiver there is also the option to set LNB 2.

LNB INSTALL MENU

1	OFFSET 1 (2)	AFC
2	LNB 1 POWER	ON
3	LNB 1	FSS
4	LNB 2	DBS

Press F for AFC ON/OFF

Contrast Menu

Contrast: any value between 1 and 8 (using ◀ or ▶ key); default value is 4; can change programme to check contrast setting across several programmes and optimise as required.

CONTRAST	4

Background Colour Menu

Background Colour: only present for the dual input receiver and can have any value between 1 and 8 (using ◀ or ▶ key); default value is 4 (blue). For single input receiver plain screen is always blue.

BACKGROUND COLOUR	4

IMPORTANT OPERATIONS

If the TV has been connected via coaxial cable, the UHF Tuning Menu (a sub-menu of the Install Menu) is an important starting point for adjusting the receiver. Consult the Quick Start Instructions.

LNB Install Menu

Reach this menu via the Main and Install menus. The Install Menu is used to make "global" adjustments for all programmes. Before making any adjustments, allow a few minutes for the LNB to reach its full operating temperature.

OFFSET is the first option on the menu. The LNB offset is adjusted to compensate for variations in LNB output frequency and to give a picture as free from sparklies as possible. The factory default is AFC (automatic frequency control) as the receiver can compensate automatically for variations in the LNB's frequency.

You may occasionally need to set an actual value for OFFSET, if you do not see a good quality picture with AFC. To do this, proceed as follows.

Select a programme which has LNB 1 assigned to it (so that option 1 is OFFSET 1).

At option 1, press the F key to turn AFC off, then press the ◀ or ▶ key to go through the available values one at a time until you get the clearest picture. The offset can have any value between -15 and 15.

If the receiver is a dual input model, select a programme which has LNB 2 assigned to it and repeat the above procedure to get the clearest possible picture for OFFSET 2.

If the menu contains an LNB 1 POWER option, make sure this is turned ON unless LNB 1 is an SMATV communal dish aerial.

At the LNB option (and LNB 2, if present) set the correct frequency band for the programmes you wish to receive from a particular satellite via that LNB. Failure to do this will not prevent reception of these programmes, but their frequencies will be shown as the wrong value in the Tuning Menu.

FSS	10.950 - 12.100 GHz e.g. Astra
DBS	11.700 - 12.850 GHz e.g. TDF
T-COM	12.425 - 13.575 GHz e.g. French TELECOM

Before leaving the LNB Install Menu, press the STORE key to store the settings.

LNB INSTALL MENU

1	OFFSET 1 (2)	AFC
2	LNB 1 POWER	ON
3	LNB 1	FSS
4	LNB 2	DBS

Press F for AFC ON/OFF

Tuning Menu

Reach this menu via the Main and Programme Setup menus. The Programme Setup Menu is used to make adjustments on a per-programme basis.

Use the Tuning Menu to set the frequency and polarity of a programme if you know these, the satellite value and LNB (if this option is present).

Note that some early dish positioners need a software upgrade to be fully compatible with the SATELLITE option. They will however respond if, when the SATELLITE option has been set for each programme, the receiver and positioner are connected together via a SCART lead and then any **one** programme number from each satellite is programmed (at the positioner) against its appropriate position number. (This contrasts with earlier receivers, where each programme number has to be programmed, at the positioner, against the appropriate satellite's position number.)

To find new programmes, turn on the frequency scan by pressing the F key followed by the ◀ or ▶ key while the FREQUENCY option is selected. The frequency value will keep changing and then stop when the next satellite transmission frequency in the band is reached. The background to the menu will be a solid colour until the transmission frequency is reached, then a programme appears as the menu's background. If this is a transmission you want to allocate to a programme number, press the F key to exit the scan. If it is not, press the ◀ or ▶ key to continue the scan.

There is a quick scan mode which is very useful when you first align a dish aerial and the signal is too weak to disable the plain background in normal scan mode.

While in frequency scan mode, press the AUX/0 key to start quick scan mode. The receiver will scan quickly through the whole frequency range and there will always be a picture (although this will sometimes be noisy and distorted) as the menu's background. When the dish has been aligned sufficiently to obtain a stronger signal, press the AUX/0 key again to return to normal scan mode.

When you have set all the tuning information for the programme, press the STORE key. You will be requested, via an on-screen message, to assign this information to a programme number. Key in the required number and press the STORE key again.

TUNING MENU

1	FREQ <SCAN>	11.318
2	POLARITY	V
3	SATELLITE	2
4	LNB	1

Press F then LEFT/RIGHT to start scan

Displaying a Programme Immediately on Power On

Generally, when you switch on the mains power to the receiver, it will be in standby mode. You can, however, program it to display a specified programme immediately. This is not recommended for individual installations, as any interruption of the mains supply will cause the programme to appear on screen when the mains supply is restored. It is, however, useful in SMATV applications, where there is a communal dish aerial.

Press the F key followed by the RECALL key, then key in the programme number using the P-/-- key and numeric key(s). Press the STORE key to store this setting.

Download Menu

Reach this menu via the Main and Install menus. Use it to download all the information in the receiver's E^2PROM to a second receiver of the same type.

Follow the instructions given on-screen. It is very important that you follow the on-screen instructions exactly, otherwise errors may occur.

During the download, messages appear on-screen to tell you the programme information currently being downloaded. The download takes about 15 seconds, then the message Download COMPLETE should appear. When this message has appeared, you can disconnect the second receiver.

If the download fails for any reason, the message Download ERROR will appear.

When the download is complete, press the STORE key to return to the Install Menu or the NORM key to return to normal viewing mode. If, at any stage before the final pressing of the STORE key, you wish to stop the download, press the NORM key.

Resetting Factory Defaults

To reset the PIN to its default value of 1234, turn off the mains power to the receiver, then press and hold down the ⏻ key while you turn on the power again. You need to hold down the key as long as the characters DP are displayed on the screen. This action will also unlock any locked programmes and unlock the menus, if they were locked.

To reset all of the parameters (including the PIN) to their factory defaults, put the Main Menu on the screen then press the P-/--, STORE, ▶ and ◀ keys quickly, one after the other, in that order. Note that this will result in any user customisation of programmes being lost.

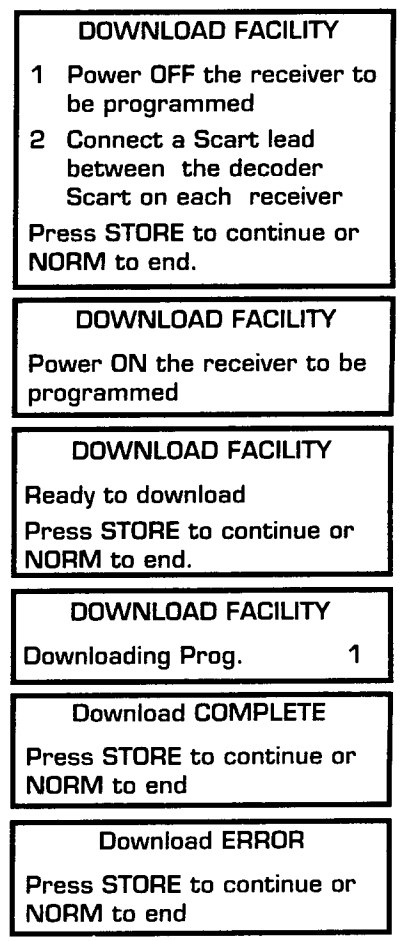
The programme listing will default to that stored in the microprocessor chip U2. This may not be the same as the programme listing which was in the receiver when it left the factory, as this listing is downloaded before shipment.

Cancelling a Plain Coloured Screen

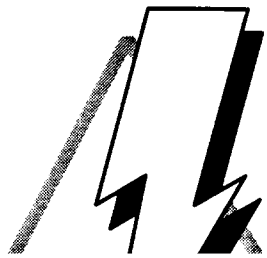
Received signals need to be of a certain strength to give a picture on the screen. If they are not strong enough, there will be a plain, coloured screen. To cancel this plain screen, press the F key followed by the STORE key.

This feature is useful when you are trying to tune in to weak signals (perhaps because the dish aerial is slightly out of alignment). Press F followed by STORE again to redisplay the plain screen.

NOTE: You can only perform this function outside the menu structure, therefore if there is a menu on-screen (e.g. the Tuning Menu) you will first need to exit the menu, disable the plain screen and then re-enter the menu to continue the tuning process.


DOWNLOAD FACILITY
1 Power OFF the receiver to be programmed
2 Connect a Scart lead between the decoder Scart on each receiver
Press STORE to continue or NORM to end.
DOWNLOAD FACILITY
Power ON the receiver to be programmed
DOWNLOAD FACILITY
Ready to download
Press STORE to continue or NORM to end.
DOWNLOAD FACILITY
Downloading Prog. 1
Download COMPLETE
Press STORE to continue or NORM to end
Download ERROR
Press STORE to continue or NORM to end

HANDLING ELECTROSTATIC SENSITIVE (ES) DEVICES



Many semiconductor devices, such as integrated circuits and field effect transistors, can easily be damaged by static electricity. The following precautions should be observed when ES devices are being handled.

- Always use a grounded tip soldering iron and antl-static type solder removal devices.
- Before handling a device, discharge any electrostatic charge on your body by touching a known earth point - preferably use an earthed bench mat or ground

GAINING ACCESS TO THE UNIT

REMEMBER - SAFETY FIRST

WARNING: always disconnect the unit from the mains supply before dismantling it.

WARNING: remove your wrist strap before applying power to the re-assembled equipment to avoid potential shock hazards.

WARNING: The incorrect substitution of electrolytic capacitors may result in an explosion hazard.

CAUTION: work on an earth mat and wear a wrist strap and earth lead to prevent electrostatic damage to the components. Once the main board is removed from the casing it is fairly flexible, so handle it carefully to avoid damaging the components.

CAUTION: You must replace all the PCB fixings, screws etc. when the unit is re-assembled, otherwise there could be hazards due to reduced clearances.

CAUTION: Before you apply mains power to the unit, always ensure that the voltage rating stated on the rear panel of the unit matches the mains voltage supply in the country of installation.

CAUTION: Do not spray any chemicals on or near the unit.

CAUTION: Replacements for faulty components must be of the correct value and rating and must be assembled by a competent engineer, otherwise safety approvals could be invalidated.

Removing the Cover

Remove the 5 taptite screws (A). Three are at the rear of the unit (Figure 1) and one is in each side (Figure 2).

Hold both sides of the cover and slide it towards the rear of the unit to remove it.

Removing the Front Panel

Once the top cover has been removed, remove the front panel by gently prising the two lugs (X) outwards, as shown in Figure 3.

Removing the Main PCB

Refer to Figure 3.

Remove the phono socket screw (B) and the mains socket screw (D).

Remove ground connection taptite screw (F).

Remove the 3 push rivet fixings (E).

Whilst lifting the front edge of the main PCB, crimp together the stand-off prongs (H) using tweezers to free the PCB.

Gently slide the PCB away from the rear panel to remove it from the casing.

Re-assembling the Unit

Reverse the above procedures to re-assemble the unit.

Figure 1

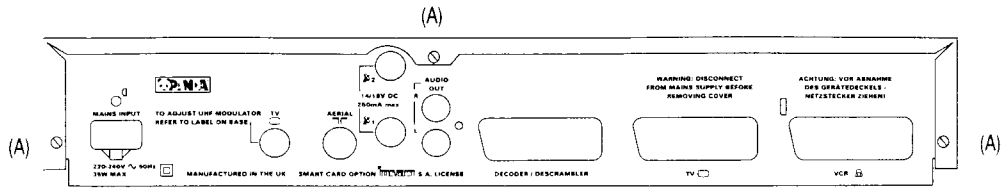


Figure 2

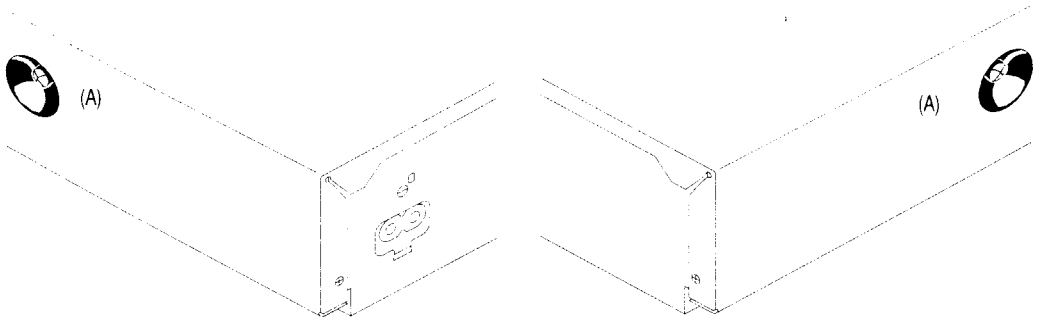
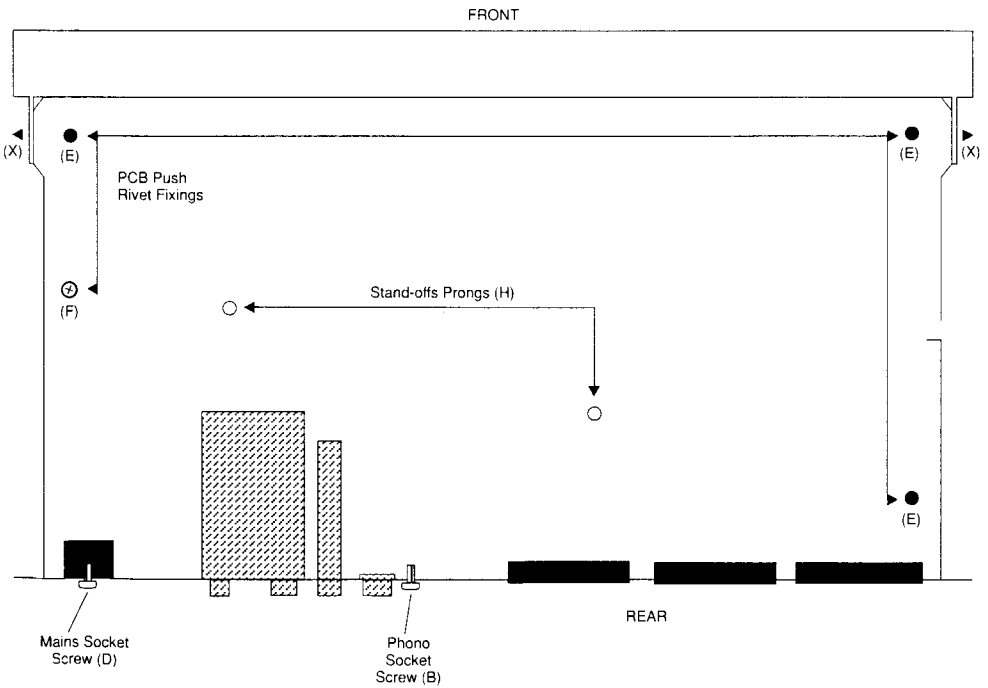
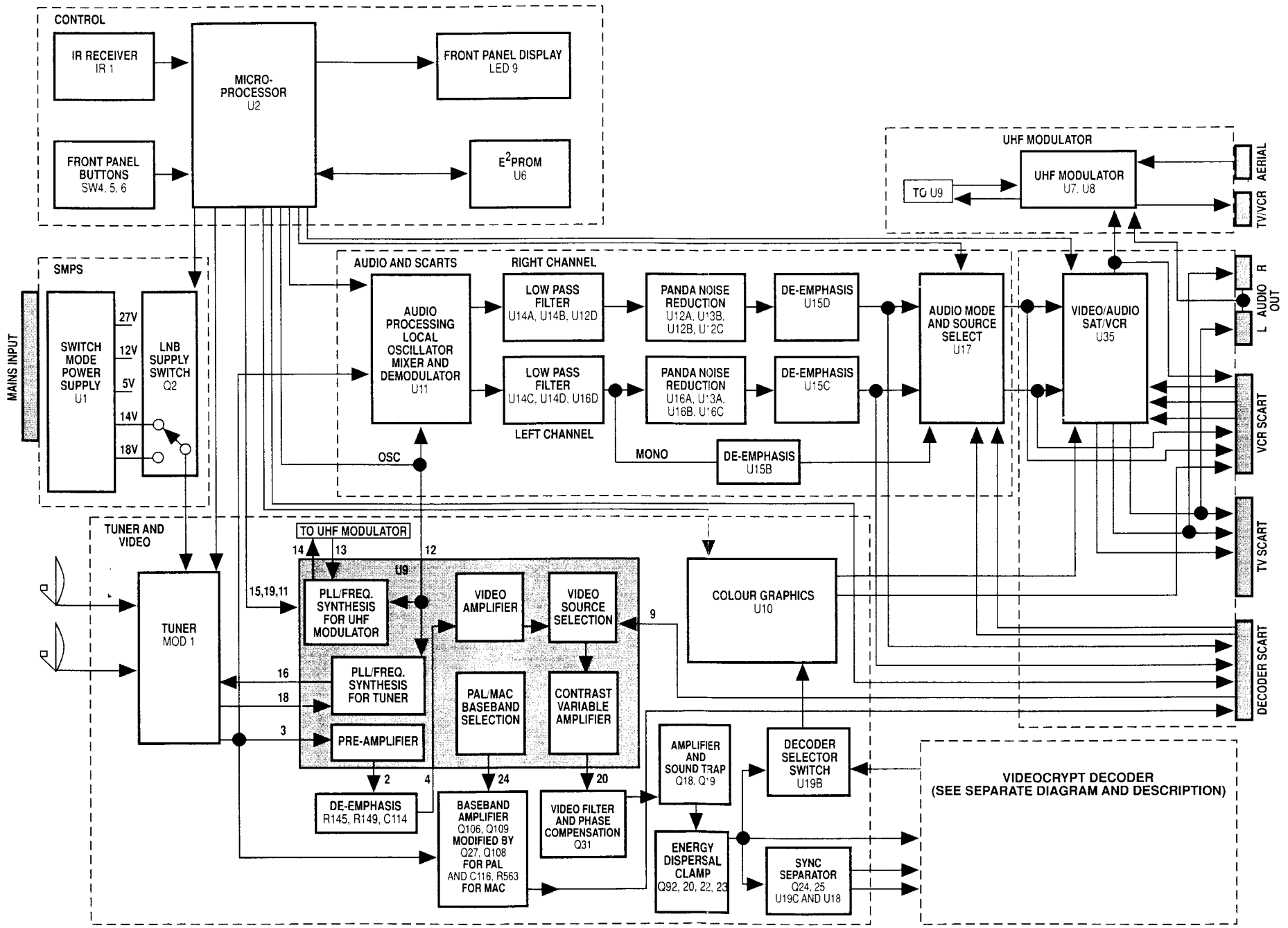


Figure 3
Top View



MAIN BLOCK DIAGRAM



CIRCUIT DESCRIPTION

All the component parts of the receiver are on one PCB.

All of the functional blocks, with the exception of the VideoCrypt decoder, are shown on the main block diagram; the decoder functions are shown in detail on a second block diagram.

TUNER AND VIDEO PROCESSING

Tuner

The desired programme is selected via the handset or front panel buttons. Data from the handset is received by the sensor IR1. The TTL level data is fed to the microprocessor U2 for decoding. U2 then interprets this information and supplies tuning data to a frequency synthesiser within U9. This synthesiser generates a tuning voltage which varies the local oscillator in the tuner (MOD 1). This voltage can be observed on pin 15 of MOD1.

The local oscillator, which is 479.5 MHz higher in frequency than the chosen programme, is mixed with the incoming signal. The desired signal is selected by an IF stage centred a 479.5 MHz and having a bandwidth of 27 MHz. The local oscillator output from the tuner is obtained from a prescaler, the output of which is the local oscillator frequency divided by 128. The 479.5 MHz FM signal is then demodulated in MOD1 to give the required composite video baseband signal (CVBS) output.

The frequency synthesis is performed by U9, which receives divider ratio data for the required programme from U2. The synthesiser generates a reference frequency from the 4 MHz clock input on pin 12 of U9. The prescaled input on pin 18 of U9 is divided down according to the divider ratio data and compared with the generated reference, the error signal being used to generate the tuner control voltage, via Q15, on pin 15 of MOD1.

To compensate for LNB frequency conversion offsets, the synthesised frequency can be varied, automatically, by U2. This process, known as automatic frequency control (AFC) keeps the TV signal central in the 479.5 MHz bandpass filter in MOD1.

For a receiver which has a dual LNB input tuner, the Tuning Menu can be used to specify each programme as entering the receiver via LNB 1 or LNB 2. Pin 6 is the select line for LNB 1 and it is enabled by Q17; pin 4 is the select line for LNB 2 and it is enabled by Q16. Pin 5 is the supply line for LNB 1 and pin 3 is the supply line for LNB 2. The line which controls both the supply and select for LNB 1 comes from pin 11 of U5 in the control circuitry. In a similar manner, pin 10 of U5 controls the supply and select for LNB 2. For a receiver which has a single input tuner, the select line on pin 6 of the tuner is not used and the supply is via pin 5. In the dual input receiver the supply to LNB 1 can be switched on or off at the LNB Install Menu. Pin 9 of U5 controls this switching which is carried out by Q61.

The tuner has a 5 V supply and 27 V is available for the tuning voltage.

The baseband signal from pin 13 of the tuner is coupled to the baseband amplifier, video amplifier and audio circuitry via an emitter-follower Q100 and R520.

Baseband Amplifier

Q106 and Q109 form a two-stage amplifier whose output is buffered to pin 19 of the decoder SCART connector SK5. The buffered output goes through an emitter-follower Q110 and R267 to drive an output impedance of 75 Ω.

MAC and PAL transmissions use different pre-emphasis when transmitted via satellite. The incoming signal format, PAL or MAC, can be selected at the External Decoder Menu (a sub-menu of the Programme Setup Menu). The PAL/MAC baseband selection switches between the different de-emphasis curves. This is implemented within U9 (under control from U2) and output on pin 24 of U9.

If PAL is selected, the response of the amplifier is modified by the PAL de-emphasis circuit R148, R266, C112 and C113. In addition, there is compensation for insertion loss implemented by Q108 switching R596 in parallel with R597, thereby increasing the gain of the first stage of the amplifier.

If MAC is selected, the PAL response of the amplifier is modified by C116 and R563 to give MAC de-emphasis.

Video Processing within U9

The baseband output from the tuner enters a pre-amplifier in U9 via pin 3. The gain of the pre-amplifier is set by R134 and R135 and the input is centred around VMID which is 2.5 V. The output from the pre-amplifier is inverted and output from pin 2 of U9. This output is de-emphasised by the circuit R145, R149 and C114.

The signal then re-enters U9 at pin 4 and is fed to the video amplifier within U9. The output from this video amplifier is inverted, it passes out of U9 and then straight back in again where it forms one of the two possible video inputs to the video source selection switch within U9. The second possible video input to this switch is from pin 20 of the decoder SCART connector SK5; it enters U9 at pin 8.

The appropriate video signal from this switch then passes out of U9, enters it again and is fed to a non-inverting contrast amplifier within U9 which can be varied under control from U2. The output from this amplifier at pin 20 of U9 is then filtered.

Video Filter and Phase Compensation

After the video signal has been amplified in U9, it is coupled to a low pass filter comprising L10, L11 and C103 - C106 which has a cut-off point of 5.5 MHz. Q31 provides phase compensation.

Amplifier and Sound Trap

After being filtered and phase-compensated the video signal passes through an amplifier and sound trap (Q18, Q19 and associated components) to remove any residual audio sub-carriers. It then passes to the energy dispersal clamp.

Energy Dispersal Clamp

All satellite transmissions are transmitted with energy dispersal to distribute the transmitted energy more evenly across the transmitted bandwidth. Energy dispersal is a triangular 25 Hz waveform added to the signal. If this triangular signal remains added to the video signal, a flickering can be seen on the screen, therefore this triangular modulation must be removed.

To achieve this, the video signal is ac coupled via a buffer (Q20, C132 and C313) and then clamped to a fixed level during the colour burst period by Q92. Colour burst gating pulses are generated from U18 and are then applied to the gate of Q92 which clamps the signal to a fixed voltage defined by D44, Q22, R172 and R171. Note that D44 is a 2.4 V Zener diode which can be found in the VideoCrypt decoder circuit diagram by pin 7 of U20.

Sync. Separators

The clamped video signal passes to the sync separators, of which there are two on the PCB.

The first comprises Q24, Q25, D38, R179 and R180 and is used to generate a composite sync signal which is then fed to pin 30 of the graphics generator U10. The second comprises U18 and its associated components and is used to generate vertical sync pulses at pin 15 and colour burst gate pulses at pin 12. These pulses are transferred from 12 V to 5 V pulses by D69 and are used for the energy dispersal clamp and VideoCrypt timing.

This second sync separator also gives out a "Station ID" signal from pin 7 of U18 to indicate whether or not a video signal is present. This is used to switch in the plain coloured background to the menus when no video signal is present (and the menu is therefore not superimposed on a programme).

Colour Graphics Generator

This is U10 and associated components and is used to generate the background colour(s) of the menus and their text characters, under control from the microprocessor U2. For the dual input receiver there is a choice of eight background colours, for the single input receiver only blue is available. There are two graphics modes for the menus: plain background and superimposed on a programme. There are two oscillators associated with U10.

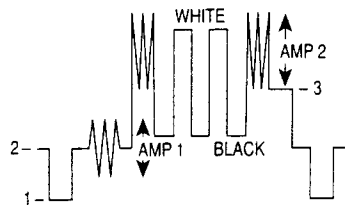
The first oscillator is the crystal X2 which generates a frequency of 17.734 MHz. This is exactly 4 times the frequency of the colour information which is used to generate the background colour(s) and is therefore relevant to plain background mode. If this frequency is not within a few hundred hertz of 17.7344 MHz, there will be no colour to the on-screen graphics display.

The second oscillator is within U10 and it runs at approximately 7 MHz, its frequency being set by external components L12, C119 and C120. This is used, together with

horizontal and vertical sync pulses, to generate the character positions on the screen. The horizontal and vertical sync pulses are generated within U10. For the superimposed mode this generation of the sync pulses is from the composite sync signal which enters U10 at pin 30; for plain background mode this composite sync input is not required for the pulse generation.

For both modes the black and white levels for the characters are generated by R155 and R156 (black) and R153 and R154 (white). They are input on pin 14 for black and pin 15 for white.

In plain background mode, one line of the video signal looks like the adjacent figure. The various levels shown and the amplitude of the bursts are determined by the components associated with specific pins of U10. A table of these pins is given below the figure.



Parameter	Pin
Level 1	9
Level 2	16
Level 3	17
Black level	14
White level	15
Amplitude 1	20
Amplitude 2	19

UHF MODULATOR

The RF output to the TV is generated by a frequency synthesised UHF modulator. This allows the RF output to be precisely tuned to any channel within the UHF bands IV and V (channels 21 - 69).

The circuitry consists of two main component parts, a loop-through amplifier between the aerial input and the output to the TV/VCR, and the UHF modulator itself, which comprises U7, U8 and associated components. The circuitry requires two power supply inputs, one to supply the amplifier (which is always active) and one to supply the UHF modulator itself (which is powered off in standby mode).

The heart of the modulator is the IC U7, a block diagram of which is shown adjacent.

It comprises the following:

- a voltage controlled oscillator that covers the full UHF band;
- an audio oscillator for the sound sub-carrier;
- an amplitude modulator to modulate the UHF carrier with the video;
- a video automatic gain control and clamp to ensure the correct modulation index.

The VCO within U7 is completed by the tuned circuit connected to pins 9,10,12 and 13 of U7.

Tuning is enabled by a DC tuning voltage in the range 0 to 24 V being applied to the varicap diode D21.

Differential outputs from pins 7 and 8 of U7 are fed to pins 3 and 2 respectively prescaler IC U8, which divides them by 64. The output from pin 7 of U8, which should be in the range 7.1875 MHz to 13.4375 MHz, is fed into the UHF modulator's phase locked loop (PLL) circuitry within U9, entering U9 at pin 13.

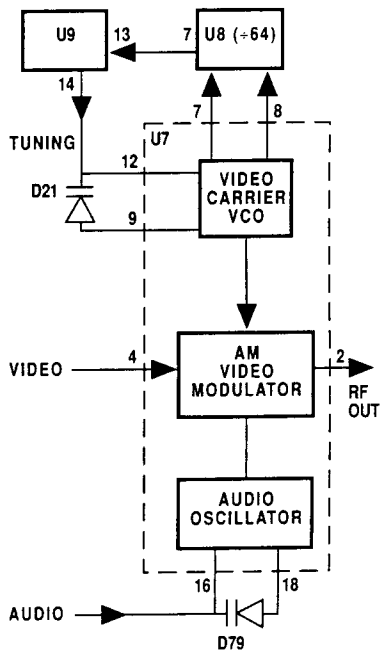
The tuning voltage is derived from pin 14 of U9. It is integrated by Q9, Q97 and associated circuitry and eventually fed to the cathode of D21.

The audio subcarrier oscillator tuned circuit is connected across pins 15 and 16 of U7. This is set at the audio subcarrier frequency (6 MHz for PAL I; 5.5 MHz for PAL G). The audio signal from U15 is fed to the varicap diode D79 which is biased at approximately 8 V. (Note that C144 must be a P2H dielectric to temperature compensate the audio subcarrier oscillator.) This causes the oscillator to be frequency modulated. R103 and C75 provide audio pre-emphasis.

The video signal is fed into pin 4 of U7 via a video filter C67, L30 and C66. This is used to amplitude modulate the VCO output. The modulation index is set to be 80% by resistor R98 on pin 3 of U7.

The output from pin 2 of U7 is fed via a high pass filter (C258, L8 and C244) and a resistive pad (R405. R404 and R472) into a balun L4 which mixes the signal with the terrestrial video signals.

The loop-through amplifier comprises Q10 and Q11. Inputs from the terrestrial antenna pass through a resistive pad (R564, R565 and R566) and a 27 MHz high pass filter C54 and L5. Lightning protection is provided by D22. There is also further high pass filtering by C63, L6 and C41. RF and DC feedback are provided by R82. The output of gain stage Q10 is then fed through another resistive pad (R92, R93 and R94) to give good reverse isolation. RF and DC feedback for Q11 are provided by R86. The output from Q11 feeds the balun L4.



CONTROL CIRCUITRY

The main component in the control circuitry is U2 which is based on the Z8 microprocessor. In some receivers U2 is a custom-masked single component, but in some early models could be a small µP sub-assembly board containing a standard microprocessor and a separate ROM. This µP board contains four capacitors (C3, C4, C5 and C6), three ICs (U1, U3 and U4) and 4 MHz crystal X1. A parts list for this board is given at the end of this manual. Note that the C3, C4, C5, C6, U1, U3 and U4 in this list are quite different from the components with those names which are on the main PCB.

U2 performs the following functions:

- It detects and decodes the codes received via the IR beam from the handset and from the front panel buttons.
- It generates the control signals for the on-screen graphics.
- It controls the frequency synthesis loops for the tuner and for the UHF modulator.
- It controls the routing of the video and audio signals.
- It controls other switching functions such as the LNB supply switching.
- It activates the front panel 3-character display.

U6 is an E^2PROM which is used to store information which is set at the on-screen menus.

U3 and U4 are buffers which limit the current at the ports of U2.

U5 is a multiplexer which determines which of the 3 characters of the front panel display is illuminating at a particular time (although the switching is so quick that they appear to be illuminating simultaneously). U4 determines which of the segments in the 7 segments of each character illuminate, and therefore works in conjunction with U5. These functions are controlled by U2 which runs with a 4 MHz clock generated by crystal X1.

AUDIO PROCESSING

Local Oscillator, Mixer and Demodulator

All of these 3 functions are carried out by the audio processing IC U11. The baseband video signal enters pin 24 of U11 via C156. The desired audio sub-carriers are selected by being mixed with a frequency synthesised oscillator to frequencies 10.52 MHz and 10.7 MHz. The oscillator's mixer frequency is controlled by L14, C146 and D39 and the control voltage generated from pins 2 and 3 of U11. The control voltage depends on the sub-carrier selected at the Audio Menu and is therefore controlled from the microprocessor U2.

There are two IF outputs from U11 on pins 21 and 22. Pin 22 is used to drive two filters X3 and X5 which are 10.52 MHz and 10.7 MHz respectively. These frequencies are fed into pins 17 and 15 of U11 respectively, and are demodulated within U11. The FM discriminator slopes are factory tuned by L15 and L16 to set the dc bias of approximately 2.5 V at the audio outputs (which are pin 8 for L27, pin 11 for L15 and pin 14 for L16). The audio outputs from U11 are pin 11 for the right channel and pin 14 for the left channel.

Low Pass Filter

NOTE: The left channel is described below. The right channel is the same, except that U14A, U14B and U12D need to be substituted for U14C, U14D, and U16D.

The demodulated signal from U11 is amplified by U14C, which is configured as a non-inverting amplifier with a gain of 7. It is then passed to two low pass filters (U14D and U16D) connected in series. The filters have their 3 dB points set at 50 kHz and 8 kHz respectively. The combined response of the filters gives a cut-off frequency of 15 kHz with an attenuation slope of approximately 24 dB per octave. The signal then passes on to be de-emphasised.

50 µs De-emphasis

All stereo channels are fed via the PANDA noise reduction circuitry to the de-emphasis circuitry, but the mono channels can have 50 µs de-emphasis (although only mode Mono 1 is preset to 50 µs).

This mono audio signal is de-emphasised by U15B and then passed directly to U17, the audio mode and source selection switch.

PANDA Noise Reduction System and De-emphasis

NOTE: The left channel is described below. The right channel is the same, except that U12A, U13B, U12B, U12C and U15D need to be substituted for U16A, U13A, U16B, U16C and U15C.

The PANDA noise reduction system is used by Astra for its narrowband FM sub-carriers to give superior dynamic range and signal to noise performance. At the time of transmission, the signal is compressed according to its level and frequency, therefore, for an FM system, a smaller bandwidth is required. This introduces less noise therefore more sub-carriers can fit into a given channel.

At the receiving end, the signal must be correspondingly expanded to reproduce the original signal. The expansion is achieved using a dual compander IC NE572 (U13A). The input to U13A comes via U16A, which is used as a level converter and has its input biased at mid-rail to allow full swing on the output.

The expander consists of a variable gain cell (Δ gain), and rectifier. The input signal is fed to the variable gain cell and rectifier. The output of the rectifier controls the gain so that the output is proportional to the average value of the input.

U16B converts the current from the gain cell within U13A to a voltage, which is then passed through a low pass filter U16C to remove the high frequency content of the signal.

Finally the signal is de-emphasised by U15C and the output from this IC is fed to pin 3 of the decoder SCART connector SK5 and to the audio mode and source selection switch. U17.

Audio Mode and Source Selection

The audio mode and the audio source are selected by analogue switches within U17, under control from the microprocessor U2. The preset audio modes are listed in the specification at the front of this manual. It is also possible to customise audio modes in the range 5 to 9 MHz.

VIDEO AND AUDIO SIGNAL ROUTING

The TV/SAT control line is connected to pin 8 of the TV SCART connector SK7. The majority of TVs which have a SCART input respond to the state of this line in the following way. If the line is high (5 - 12 V approx.) the TV takes its input from the TV SCART socket, otherwise it takes its input from the TV's tuner. The state of the control line is set by the TV/SAT and ⏻ keys on the handset. In addition, if a VCR is connected to the VCR SCART connector SK6, it can also control the line. The selected TV signal source resulting from the various combinations of the three inputs is shown in the table below.

Receiver status	TV/SAT selection	VCR SCART	Picture displayed is from
ON	SAT	HI	SAT
ON	SAT	LO	SAT
ON	TV	HI	VCR
ON	TV	LO	TV TUNER
STANDBY	TV (automatic)	HI	VCR
STANDBY	TV (automatic)	LO	TV TUNER

SWITCH MODE POWER SUPPLY

Mains Input and Rectification

Diodes D1, D2, D3 and D4 rectify the ac mains voltage and, together with smoothing capacitor C2, provide the dc input HT for the SMPS. C1 and T1 form a mains filter to minimise the feedback of RFI into the mains supply. Asymmetrical mains pollution is reduced by the insertion of R19 and C9 between the primary ground and the secondary chassis ground. These components are required to satisfy the mains isolation requirements. They are also safety-critical components of the correct type.

SMPS Controller U1

The start-up supply for U1 is obtained via R2 which charges C6 to approximately 6 V before U1 will power up. C6 sustains a charge long enough for the switch mode to reach its operating frequency. The supply for U1 is subsequently obtained from a feedback winding of the transformer T2, rectified by D8.

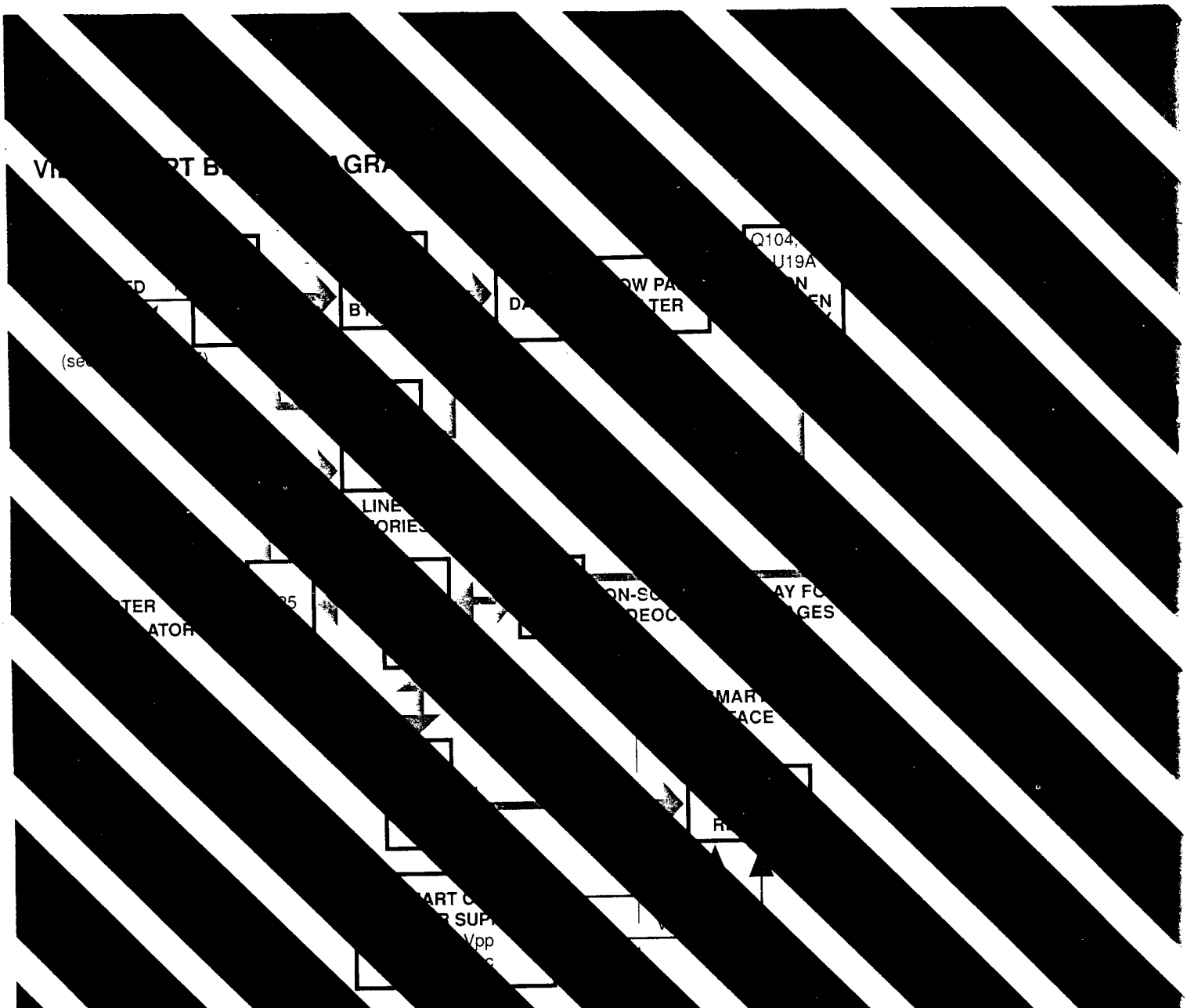
The frequency of the switch mode is set by R13 and C4 and should be 25 to 30 kHz.

Regulation is via the feedback winding which is rectified by D9 and set by R10, R11 and R12 to give a voltage of 2.4 V at pin 8 of U1 when the supplies are at their specified voltages (5 V, 12 V etc.).

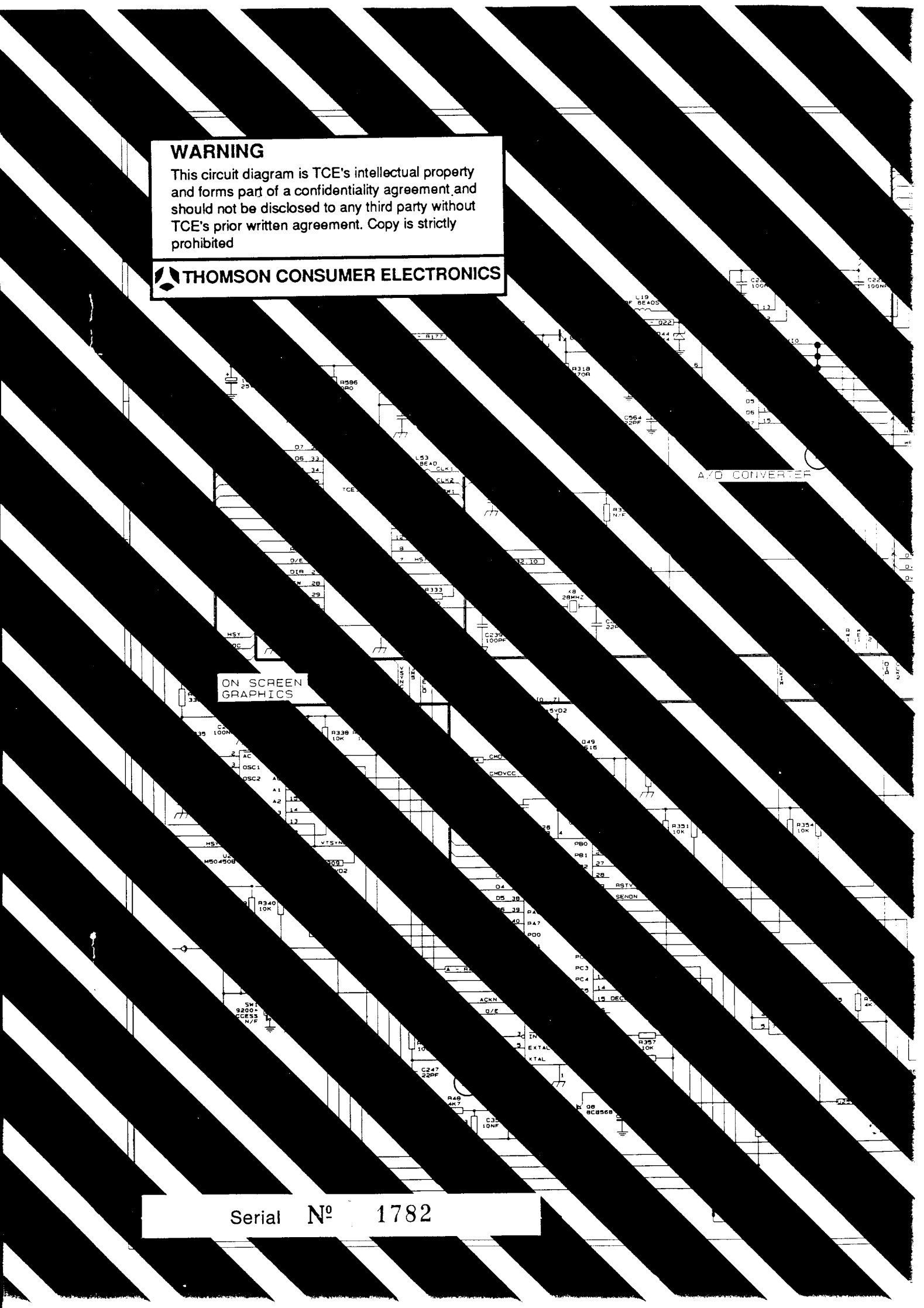
The switching transistor for the switch mode, Q1, is driven directly from U1. A negative supply is generated across D11 which is used to switch Q1 off. Excess energy from the switching of Q1 is dissipated in a snubber network R4, R5, D5, D6 and C3. Overcurrent protection is implemented by R8 and R14.

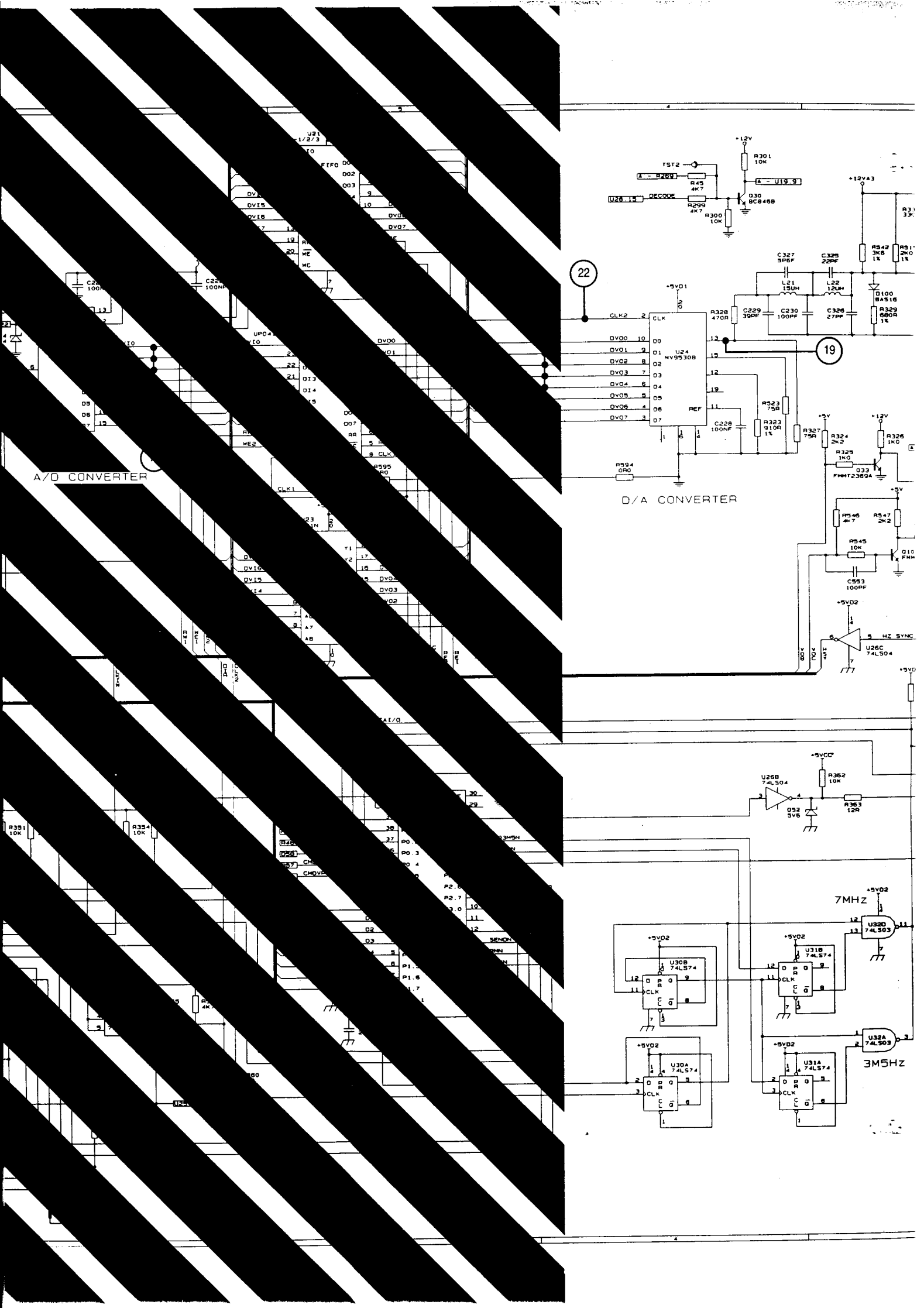
Circuitry on Secondary Side of T2

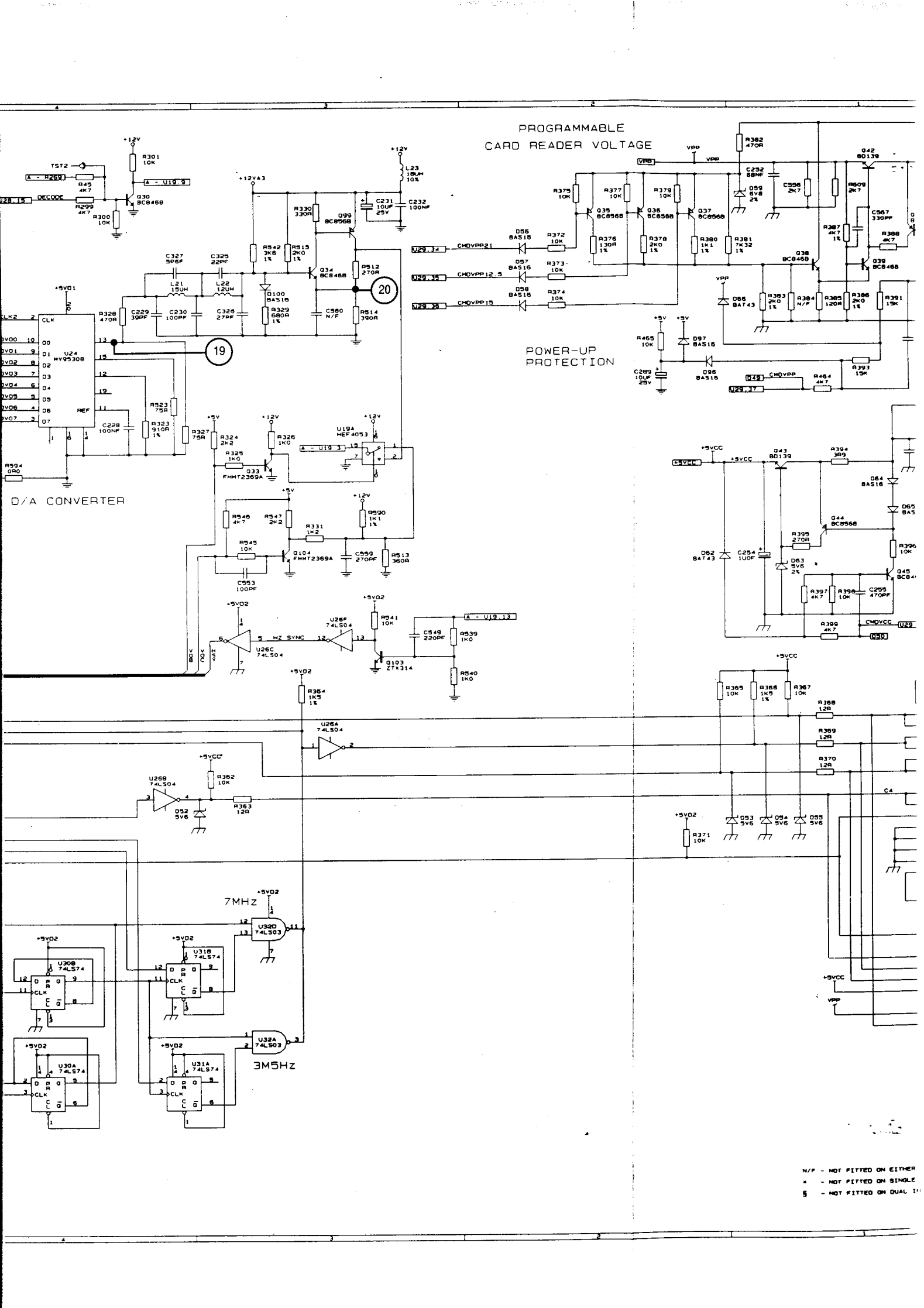
The secondary windings of the transformer T2 provide 5 V, 14 V, 18 V and 27 V supplies which are rectified, smoothed and filtered. The 12 V supply is obtained from the 14 V supply using REG1. The LNB supply is switched between 14 V and 18 V by Q2. The 5 V supply to the modulator is switched using Q3.

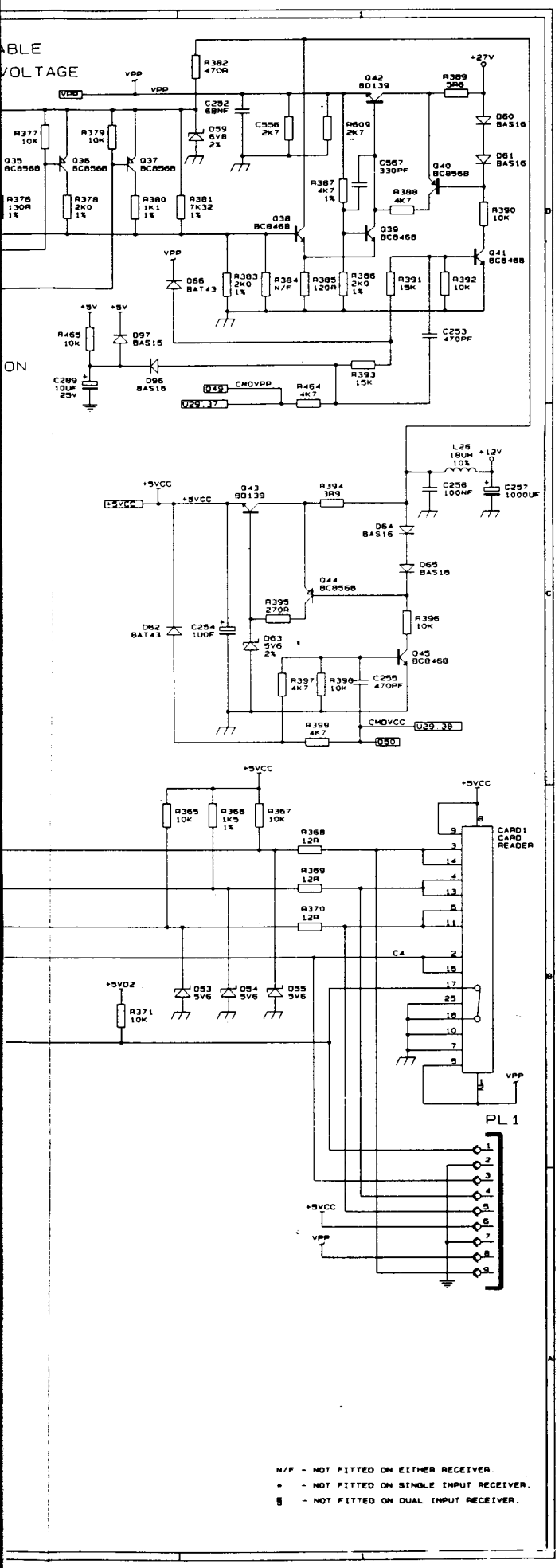


VIDEO CIRCUIT DESCRIPTION


WARNING
This circuit diagram is TCE's intellectual property and forms part of a confidentiality agreement and should not be disclosed to any third party without TCE's prior written agreement. Copy is strictly prohibited
THOMSON CONSUMER ELECTRONICS
A/D CONVERTER
ON SCREEN GRAPHICS
Serial Nº 1782


A/D CONVERTER
D/A CONVERTER
7MHz
3M5Hz
22
19
U24
MV9530B
74LS74
74LS04
74LS03


PROGRAMMABLE
CARD READER VOLTAGE
POWER-UP
PROTECTION
D/A CONVERTER
7MHz
3M5Hz
DECODE
HZ SYNC
CMOVPP21
CMOVPP12.5
CMOVPP15
CMOVCC
N/F - NOT FITTED ON EITHER
* - NOT FITTED ON SINGLE
§ - NOT FITTED ON DUAL



GRID REFERENCES - CIRCUIT DIAGRAM C

CAPACITORS

C35	A7
C125	D8
C219	D7
C220	C6
C221	D6
C222	D6
C225	C5
C227	D6
C228	C4
C229	D4
C230	D3
C231	D3
C232	D3
C233	D8
C235	C7
C236	C8
C237**	C7
C238	C8
C239	C7
C240	C7
C241	C7
C242	C7
C243	B8
C245	B8
C246	A8
C247	A7
C248	B7
C249	A7
C250**	A6
C251	A5
C252	D1
C253	D1
C254	C1
C255	C1
C256	C1
C257	C1
C289	D2
C318	B5
C325	D3
C326	D3
C327	D4
C340	C7
C341**	C7
C549	C3
C553	C3
C559	C3
C560**	D3
C564	C7
C567	D1

DIODES

D43	D6
D44	D6
D48**	C7
D49	B7
D50	B7
D51	A7
D52	B3
D53	B1
D54	B1
D55	B1
D56	D2
D57	D2
D58	D2
D59	D1
D60	D1
D61	D1
D62	C2
D63	C1
D64	C1
D65	C1
D66	D3
D76	D7
D77	B8
D96	D2
D97	D2
D100	D3

INDUCTORS

L19	D7
L20	D6
L21	D4
L22	D3
L23	D3
L24	D8
L25	C7
L26	C1
L52	C7
L53	C7
L54	D8

CONNECTORS

PL1	A1

TRANSISTORS

Q7	A7
Q8	A7
Q30	D4
Q32	D7
Q33	C3
Q34	D3
Q35	D2
Q36	D2
Q37	D2
Q38	D1
Q39	D1
Q40	D1
Q41	D1
Q42	D1
Q43	C1
Q44	C1
Q45	C1
Q99	D3
Q103	C3
Q104	C3

RESISTORS

R45	D4
R48	A7
R49	A7
R113	A7
R296	A7
R299	D4
R300	D4
R301	D4
R313**	B8
R317	D7
R318	D7
R320	D6
R321	C6
R323	C4
R324	C3
R325	C3
R326	C3
R327	C4
R328	D4
R329	D3
R330	D3
R331	C3
R332**	C7
R333	C7
R334	C7
R335	B8
R336	B8
R337	B8
R338	B8
R339	B8
R340	B8
R341	B8
R342	B8
R343	B8
R345	B7
R346	B7
R347	B7
R348	B7
R349	B7
R350	B6
R351	B7
R352	B6
R353	B6
R354	B6
R355	A6
R356	A7
R357	A7
R358	A7
R359	A6
R360	A6
R361	A5
R362	B3
R363	B3
R364	B3
R365	B2
R366	B1
R367	B1
R368	B1
R369	B1
R370	B1
R371	B2
R372	D2
R373	D2
R374	D2
R375	D2
R376	D2
R377	D2
R378	D2
R379	D2
R380	D2
R381	D1
R382	D1
R383	D1
R384**	D1
R385	D1
R386	D1
R387	D1
R388	D1
R389	D1
R390	D1
R391	D1
R392	D1
R393	D1
R394	C1
R395	C1
R396	C1
R397	C1
R398	C1
R399	C1
R464	D1
R465	D2
R512	D3
R513	C3
R514	D3
R515	D3
R522	D7
R523	C4
R539	C3
R540	B3
R541	C3
R542	D3
R545	C3
R546	C3
R547	C3
R548	A6
C556°	D1
R557	B8
R584	B6
R585	B7
R586	D8
R590	C3
R591	D6
R594	C4
R595	C5
R609	D1

ICS

U19A	C3
U20	D6
U21	D5
U22	D5
U23	C5
U24	D4
U25	C8
U26A	B3
U26B	B4
U26C	C3
U26D	A7
U26E	C7
U26F	C3
U27	B8
U28	B7
U29	B5
U30A	A4
U30B	A4
U31A	A4
U31B	A4
U32A	A3
U32B	A6
U32C	A6
U32D	B3

MISC. COMPONENTS

CARD1	B1
J1	A8
J2	A6
J3	A6
J4	A6
S17	D8
S18	C7
SW1**	A8
SW7	A8
TST1	B8
TST2	D4
X8	C7

** not fitted on either receiver

* not fitted on single input receiver

§ not fitted on dual input receiver

° a resistor occupying a capacitor position

MAIN BOARD OSCILLOGRAMS

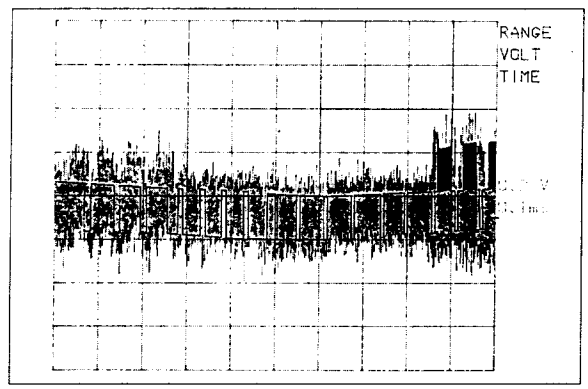
The oscillograms which follow are divided into 5 main sections: Video, Audio, Control, SMPS and VideoCrypt. It is important that, within each of these sections, you check for the presence of the signals in the order they are given (e.g. for the video circuitry you test at points 1 to 8 in that order).

The 26 oscillograms given are numbered sequentially and the appropriate section and circuit diagram letter are also given above each. The oscillogram numbers are marked on the circuit diagrams and the PCB component ident diagrams.

Alongside each oscillogram is a note of where the test is made, a brief description (including any special instructions) and an indication of which components need to be checked if the oscillogram you see on the receiver is not like that shown on the page.

Unless specified otherwise, all the oscillograms have been produced using a DC coupled oscilloscope and have ground at the bottom of the oscillogram.

1. VIDEO — CIRCUIT DIAGRAM A



Test Point: Q100 emitter

Description: AC coupled oscilloscope, 0 V at centre of oscillogram.

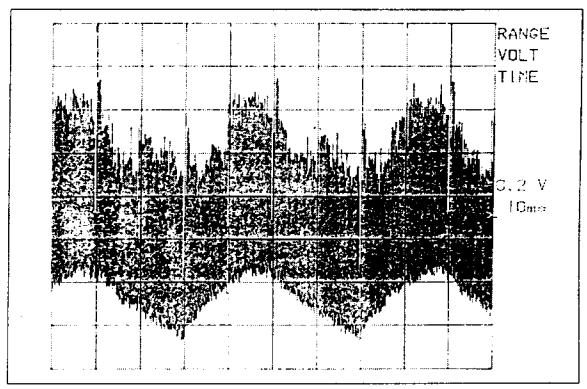
The trace shows tuner output (i.e. totally unfiltered video).

The superimposed line shows, for comparison, the expected trace for filtered video.

If the trace is not as shown, check:

- Q100;
- that the tuning voltage changes when different programmes are selected;
- the prescaler output on pin 18 of MOD1;
- the 4 MHz reference at pin 12 of U9;
- the LNB voltage on pin 5 of MOD1.

2A. VIDEO — CIRCUIT DIAGRAM A



Test Point: Q31 emitter

Description: AC coupled oscilloscope, 0 V at centre of oscillogram.

Traces 2A and 2B both show the normal video signal at point 2, only the time axis is different; there may be slight variations in the trace, depending on picture content.

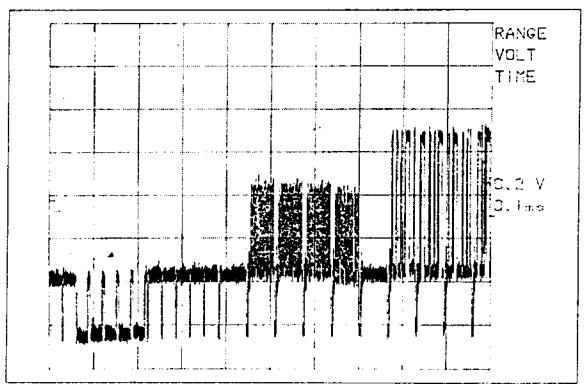
If the trace is not as shown, check:

- the route through U9, i.e. check back from pin 20 through to pin 3 of U9 to check that the trace is as shown. (Consult the circuit description for U9.)

Note that pin 3 of U9 is similar, in effect, to point 1 above.

Note that pin 6 of U9 is similar, in effect, to point 1 above, but should give a trace of much larger amplitude (approx. 3 V p-p).

2B. VIDEO — CIRCUIT DIAGRAM A



Test Point: Q31 emitter (see oscillogram 2A above)

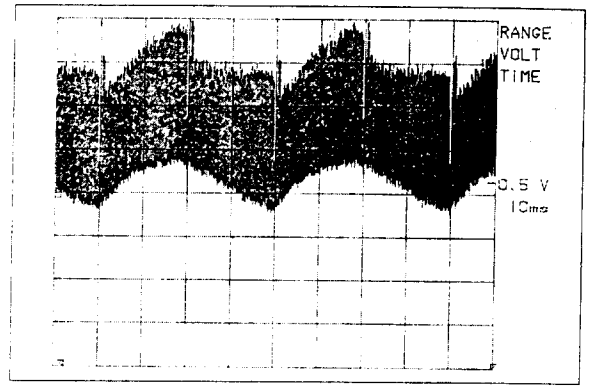
3. VIDEO CIRCUIT DIAGRAM A

Test Point: Q20 emitter

Description: The trace shows unclamped video of the correct gain. This is the video signal at one side of C132, whereas Oscillogram 4, below, shows the signal at its other side.

If the trace is not as shown, check:

- the gain stage (Q18, Q19 and Q20).



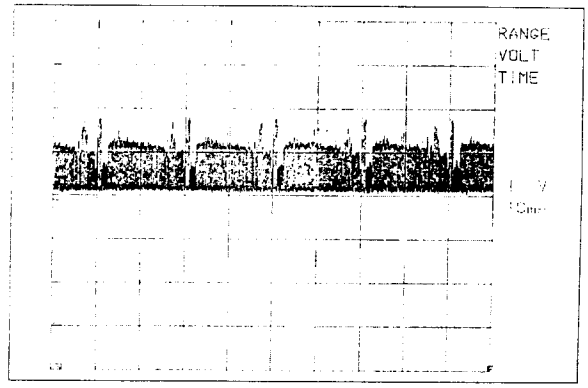
4. VIDEO CIRCUIT DIAGRAM A

Test Point: Junction of L28 and R175

Description: The trace shows clamped video at the correct DC level. This is the video signal at the opposite side of C132, as compared with Oscillogram 3 above.

If the trace is not as shown, check:

- the horizontal sync. to the gate of Q92.



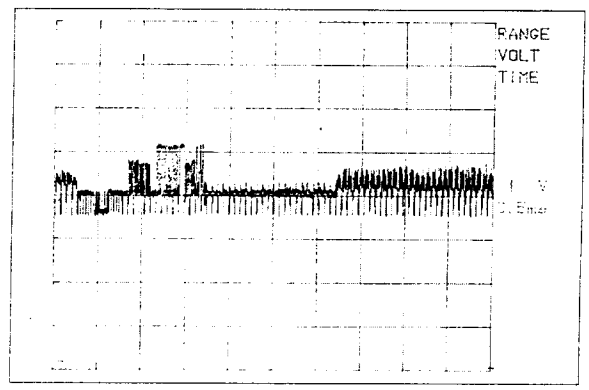
5. VIDEO CIRCUIT DIAGRAM A

Test Point: Q23 emitter

Description: This trace also shows clamped video; its DC level is important - check the DC level.

If the DC level is not as shown, check:

- Q23 and its associated circuitry.



6A. VIDEO CIRCUIT DIAGRAM A

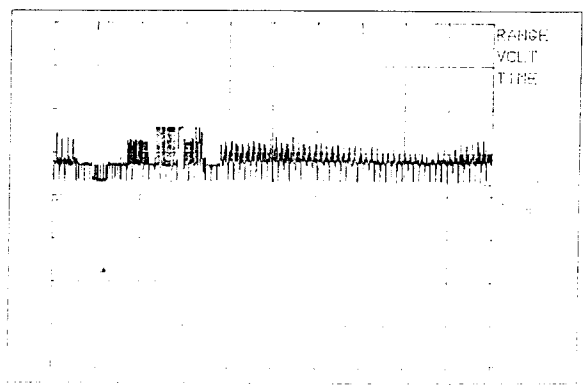
Test Point: Pin 12 of U10

Description: Trace 6A shows the trace you would expect at point 6 when there is a picture on the screen; trace 6B (next oscillogam) shows what to expect at point 6 if there is a plain coloured background with graphics on the screen.

Check for trace 6A. If this is as expected, remove the input and select a plain coloured screen with graphics (e.g. Main Menu) and look for trace 6B.

If the traces are not as shown, check:

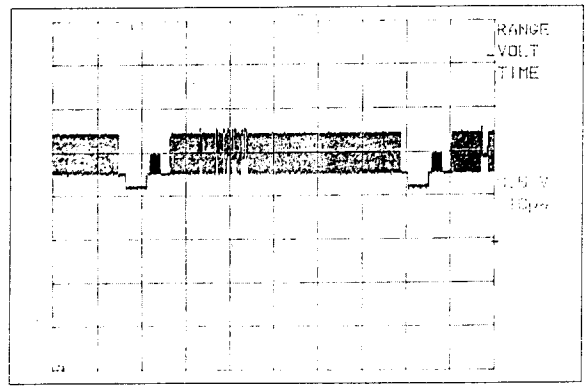
- that the composite sync is being fed into pin 30 of U10 (see oscillogram 7).



6B. VIDEO CIRCUIT DIAGRAM A

Test Point: Pin 12 of U10 (see oscillogram 6A)

Description: Trace 6B shows what to expect at point 6 if there is a plain coloured background with graphics on the screen. The graphics can be seen towards the centre of the trace.



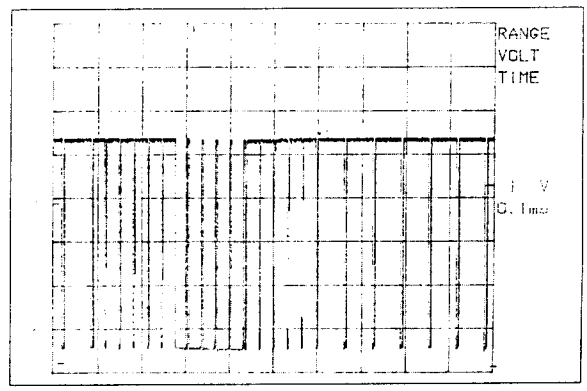
7. VIDEO CIRCUIT DIAGRAM A

Test Point: Pin 30 of U10

Description: The trace shows the composite sync.

If the trace is not as shown, check:

- Q24, Q25 and associated circuitry.



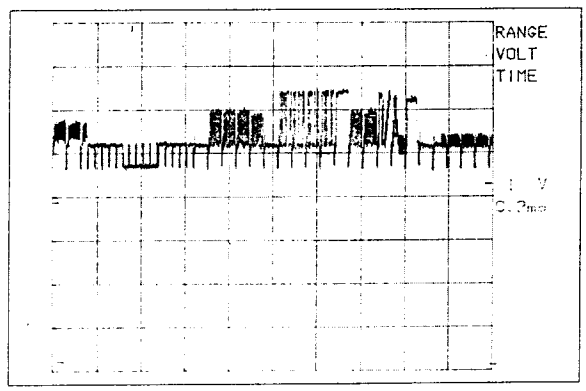
8. VIDEO CIRCUIT DIAGRAM A

Test Point: Q102 collector (VCR SCART driver)

Description: The trace shows 2 V peak-to-peak of clamped composite video.

If the trace is not as shown or has the wrong amplitude, check:

- Q102, Q26 and associated circuitry.



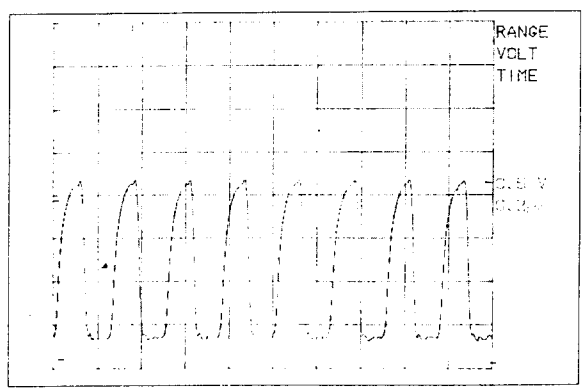
9. AUDIO CIRCUIT DIAGRAM B

Test Point: Pin 1 of U11

Description: The trace shows the amplitude of the 4 MHz reference.

If the trace is not as shown, check:

- Q98 and associated circuitry.



10. AUDIO CIRCUIT DIAGRAM B

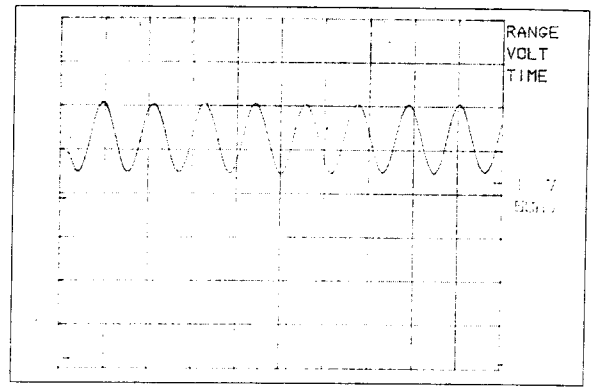
Test Point: Pin 4 of U11

Description: The trace shows an oscillation whose frequency changes as the audio subcarrier is tuned.

Find the test card, select the Mono 1 audio mode and tune between 5 and 9 MHz. The frequency of the trace should change between 15.7 and 19.7 MHz as you do this. Check also that the voltage on pin 3 of U11 changes as the frequency changes.

If the trace is not as shown, check:

- the circuitry associated with pins 2, 3 and 4 of U11.



11. AUDIO CIRCUIT DIAGRAM B

Test Point: Test point TST3 or TST4

Description: The trace should look similar at both points, as TST3 is associated with the left channel and TST4 with the right.

Check that the audio signal is centred at 2.5 V DC.

Follow the audio signal along the following paths:

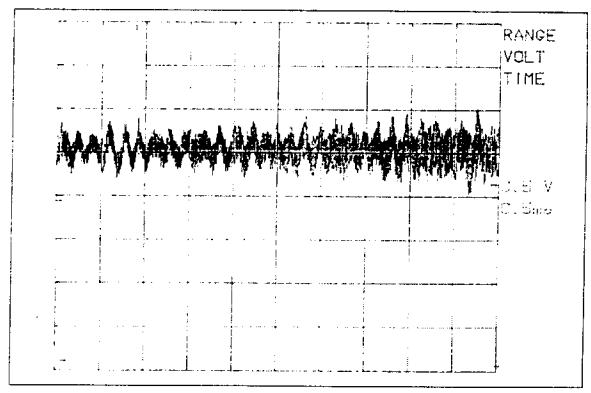
- U14 pin 8, U14 pin 14, U16 pin 8 and U15 pin 8 (left channel);
- U14 pin 1, U14 pin 7, U12 pin 8 and U15 pin14 (right channel);
- U16 pin 14, U15 pin 7 for mono.

If the signal is not centred at 2.5 V, check:

- U11 and associated circuitry.

If the trace is not as shown at any stage on the path, check:

- the IC at that point on the path or its associated circuitry.



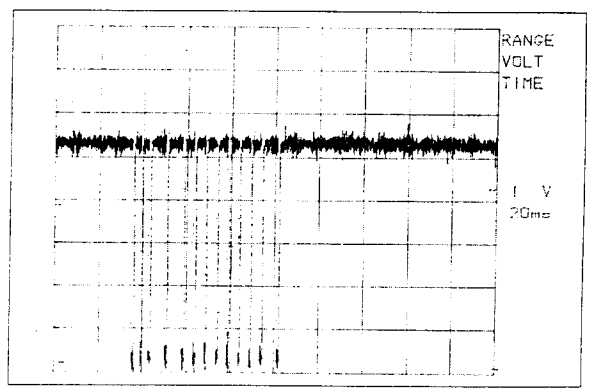
12. CONTROL CIRCUIT DIAGRAM A

Test Point: Pin 5 of U2

Description: The trace shows typical data out of the IR sensor; press keys on the handset to obtain the trace.

If the trace is not as shown, check:

- the handset;
- IR1.



13. CONTROL CIRCUIT DIAGRAM A

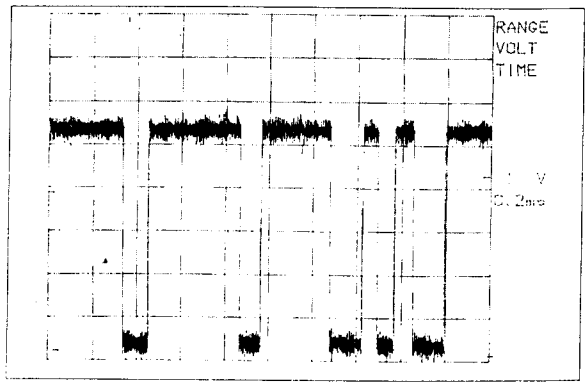
Test Point: Pin 36 of U2

Description: The trace shows a typical serial data (SDA) signal on the I²C bus when the handset keys are pressed to change the programme number.

Press the P-/-- key and/or numeric keys while looking for the trace.

If the trace is not as shown, check:

- U2 and any of the ICs on the I²C bus.



14. CONTROL CIRCUIT DIAGRAM A

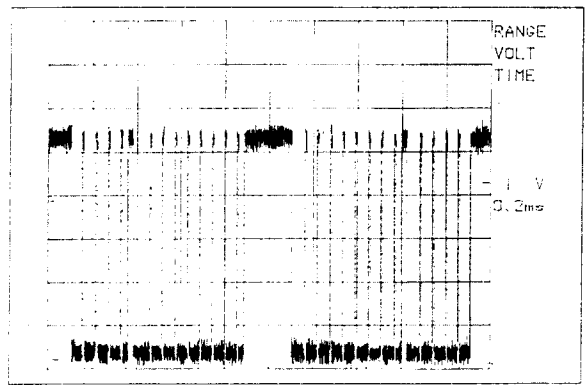
Test Point: Pin 37 of U2

Description: The trace shows a typical serial clock (SCL) signal on the I²C bus when the handset keys are pressed to change the programme number.

Press the P-/-- key and/or numeric keys while looking for the trace.

If the trace is not as shown, check:

- U2 and any of the ICs on the I²C bus.



15. SMPS CIRCUIT DIAGRAM B

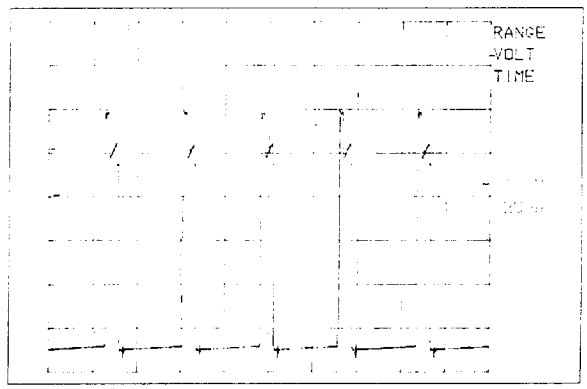
WARNING: While you are making this measurement, you and the oscilloscope must not be earthed. Do not touch any metal parts of the oscilloscope.

Test Point: Pin 5 of U1

Description: Although the oscilloscope is DC coupled, 0 V is at the centre of the oscillogram. The frequency of the trace will vary with the input voltage and the PSU load.

If the trace is not as shown, TURN OFF THE PSU and check:

- the components in the SMPS circuit.



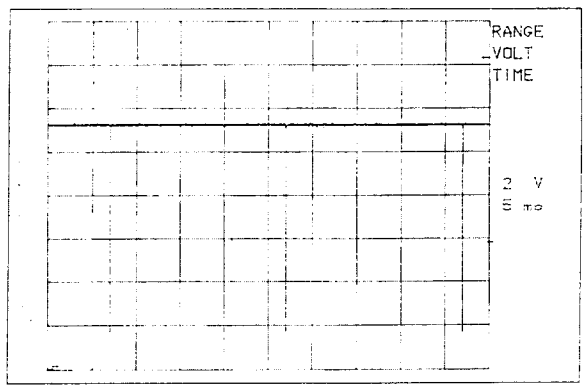
16. VIDEOCRYPT CIRCUIT DIAGRAM A

Test Point: Pin 15 of U18

Description: The trace shows the vertical sync. from the sync. sepatator circuitry (20 ms spacing).

If the trace is not as shown, check:

- U18 and associated circuitry.



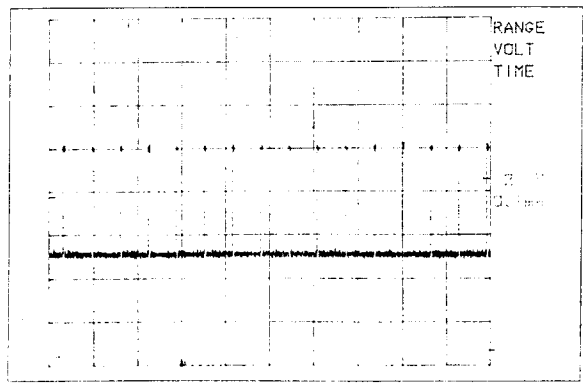
17. VIDEOCRYPT CIRCUIT DIAGRAM A

Test Point: Pin 12 of U18

Description: The trace shows the horizontal sync. from the sync. separator circuitry (64 µs spacing).

If the trace is not as shown, check:

- U18 and associated circuitry.



Test Points: Pins 4, 3, 2, 1, 18, 17, 16, 15 of U20

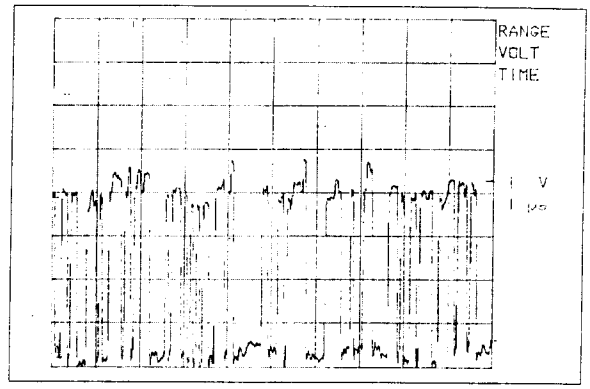
Description: The trace should look similar at all of the above test points, which are the outputs of the ADC.

Check that all 8 bits of data are present (one bit is associated with each of the above pins). Check that the data has a similar appearance by testing at pins 10, 9, 8, 7, 6, 5, 4, 3 respectively of U24 which are the equivalent DAC inputs.

If the trace is not as shown, check:

- the appropriate IC (U20 or U24).

18. VIDEOCRYPT CIRCUIT DIAGRAM C



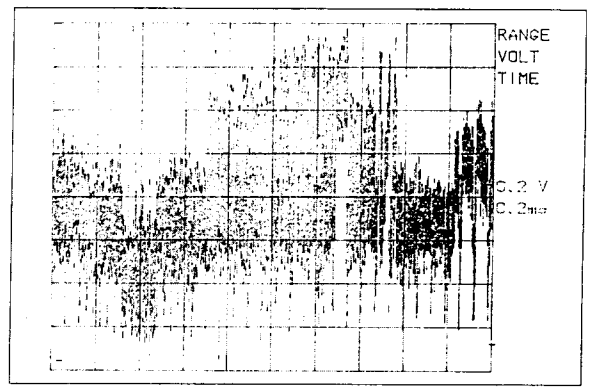
Test Point: Pin 13 of U24

Description: This is the raw video output from the DAC U24.

If the trace is not as shown, check:

- U24.

19. VIDEOCRYPT CIRCUIT DIAGRAM C



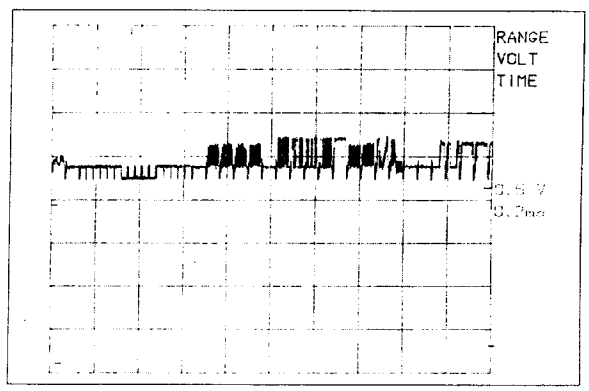
Test Point: Junction of R512 and R514

Description: This is a cleaned up version of the video signal shown in oscillogram 19 above (but note that they have different scales on the vertical axis).

If the trace is not as shown, check:

- Q34 and associated circuitry.

20. VIDEOCRYPT CIRCUIT DIAGRAM C



Test Point: Pin 4 of U19

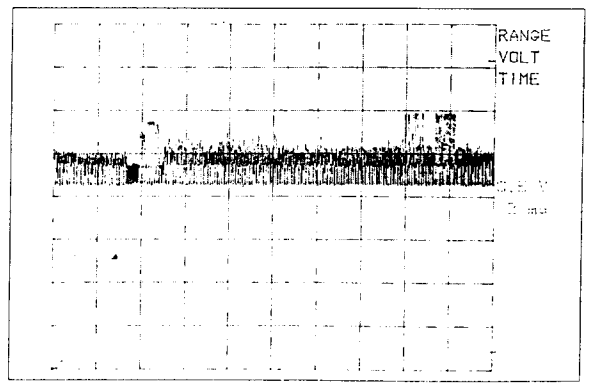
Description: The trace shows the video signal with a scale of 2 ms per division on the time axis. There are three areas of peaks. The first (leftmost) is the vertical sync. and VITS; the other two are the graphics. Oscillogram 21B (see next oscillogram) is a larger scale version of the graphics portion of oscillogram 21A.

The test needs to be carried out when an encrypted programme has been chosen but the viewng card is not inserted (so that graphics messages appear on the screen). Note the voltage level of the inserted graphics.

If the voltage level is not as shown on the trace, check:

- U19A, Q33, Q104 and associated circuitry.

21A. VIDEOCRYPT CIRCUIT DIAGRAM A

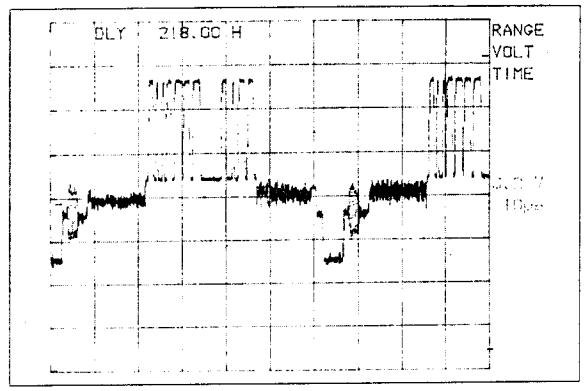


21B. VIDEOCRYPT CIRCUIT DIAGRAM A

Test Point: Pin 4 of U19

Description: AC coupled oscilloscope, 0 V in centre of oscillogram.

This is a larger scale version of the graphics portion of oscillogram 21A (see preceding oscillogram).



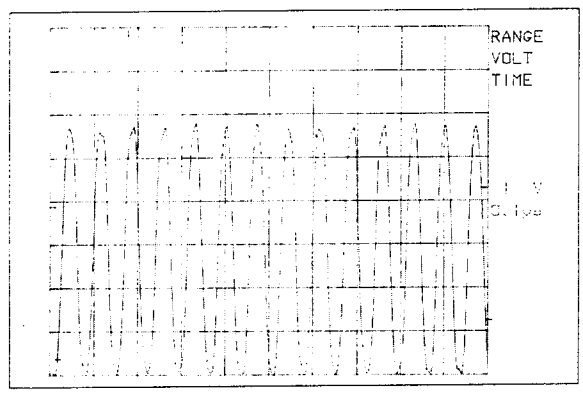
22. VIDEOCRYPT CIRCUIT DIAGRAM C

Test Point: Pin 2 of U24

Description: The trace shows the 14 MHz clock signal.

If the trace is not as shown, check:

- that X8 is oscillating at 28 MHz.



23. VIDEOCRYPT CIRCUIT DIAGRAM C

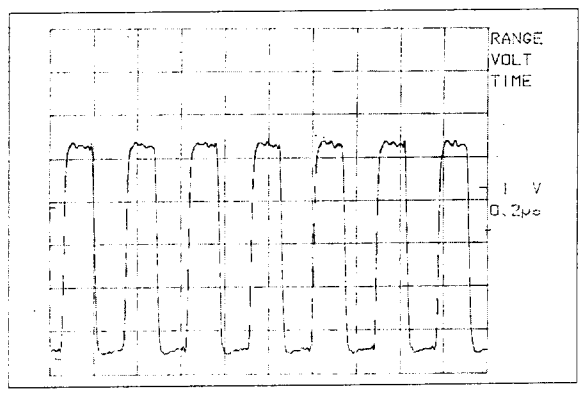
Test Point: Pin 5 of U28

Description: The trace shows the 3.5 MHz clock signal.

If the trace is not as shown, check:

- that there is a 7 MHz signal on pin 5 of U30.

Note that it is not permitted to swap out ICs U25, U27, U28 and U29.



GRID REFERENCES - CIRCUIT DIAGRAM A

CAPACITORS

C29	C4
C30	C4
C31	C4
C32‡	C4
C33‡	C4
C34	B6
C36	A7
C37	D5
C40	D7
C41	D8
C42	D7
C43	C8
C44	C8
C45	C7
C46	C8
C47	C7
C48	C7
C49	C7
C53**	D8
C54	D8
C55	D7
C56	D7
C57	D6
C58	D7
C59	D7
C61	D8
C62	D7
C63	D8
C65	D8
C66	C8
C67	C8
C70	C7
C71	C5
C72	D6
C75**	D6
C77	C7
C78	C7
C79	C6
C83	C8
C86	C8
C87	C8
C90°	B8
C91	B8
C95	C6
C96	B6
C97	B6
C98	B6
C99	B6
C100	A7
C101*	B8
C102*	B8
C103	A7
C104	A6
C105	A6
C106	A6
C107	A5
C108	A6
C109	A6
C110	A5
C111	A5
C112	A7
C113**	A7
C114	A5
C115	A4
C116	A7
C117	B4
C118**	B4
C119	B3
C120	B3
C121	B4
C122	B4
C123	B4
C124	B3
C126	B3
C127	B2
C128	B3
C129	B3
C130	A3
C131	A2
C132	A2
C133	A2
C134	A2
C135	A2
C144	C6
C150	D7
C193	A7
C194	A8
C195	A8
C196	A4
C204	C2
C205	C2
C206	C2
C207	B2
C208	B2
C209	B2
C210	B2
C211	B2
C212	C1
C213	B1
C214	B1
C215	B1
C216	B1
C244	D6
C258	D6
C259	C6
C260	C7
C261	D7
C262	C6
C263	C7
C277	A8
C278	D1
C279**	A7
C280	A7
C281**	A7
C286	B2
C294	A1
C297°*	B8
C298*	B8
C299**	B6
C300	A5
C301	C2
C303**	A3
C309	B3
C313	A2
C315**	A1
C316**	A6
C317**	A6
C319	B7
C320	C3
C330	D7
C331**	D7
C332	D7
C333**	D6
C334	D8
C335	D8
C336	C8
C337	C6
C339	C7
C342	A6
C539	C7
C540	C8
C541	D6
C542	C5
C544	A5
C545	A5
C546	A5
C548**	B7
C557	A3
C558**	A4
C561°	B3
C562	A5
C563	C3

DIODES

D20	C4
D21	C7
D22	D8
D38	A1
D41	A6
D69	B1
D70	A2
D72*	B7
D73*	A7
D74*	B8
D79	C6

INDUCTORS

L4	D6
L5	D8
L6	D8
L7	C6
L8	D6
L10	A6
L11	A6
L12	B3
L28	A2
L29	D1
L30	C8
L31	C8
L50	C7
L51	C7
L55	A3

CONNECTORS

PL3	B7
PL4	A4
PL5	B7
PL6	B6

TRANSISTORS

Q4	D1
Q5	D1
Q6	D1
Q9	C6
Q10	D7
Q11	D7
Q15	B6
Q16*	B7
Q17*	B7
Q18	A3
Q19	A3
Q20	A2
Q21**	A2
Q22	A2
Q23	A1
Q24	A1
Q25	A1
Q26	A8
Q27	A6
Q28**	D4
Q31	A7
Q58*	B8
Q59*	B8
Q60*	B8
Q61*	C8
Q92	A2
Q93	A1
Q96	D4
Q97	C6
Q98	C3
Q100	B7
Q102	A8
Q105	A8
Q106	A5
Q107**	C5
Q108	A6
Q109	A5
Q110	A4

RESISTORS

R30	D2
R31	D2
R32**	D1
R33**	D1
R34	D2
R35	D2
R36	D1
R37	D1
R38	D2
R39	D2
R40	D2
R41	D2
R42	D2
R43	D2
R44	C2
R46	C5
R47	C5
R50	C3
R51	C3
R52	C3
R82	D8
R84	D7
R85	D7
R86	D7
R87	C6
R88	C6
R89	C6
R91	D8
R92	D7
R93	D7
R94	D7
R95	D7
R96	D8
R98	D8
R103	D6
R104	C7
R109	C7
R128	B6
R130	B6
R131	B6
R132	B6
R133	B6
R134	B6
R135	B6
R136*	B7
R137*	B7
R138*	B7
R139*	B7
R140*	B7
R141*	B7
R142	A7
R143	A6
R144	A6
R145	A5
R148	B6
R149	A5
R150	A7
R151	B4
R152	B4
R153	B4
R154	B4
R155	B4
R156	B4
R157	B3
R158	B2
R159	B3
R160	B2
R161	A3
R162**	A3
R163	A3
R164	A2
R165	B2
R166	A3
R167	A3
R168	A3
R169	A3
R170	A2
R171	A2
R172	A2
R173	A2
R174	A2
R175	A2
R176	A1
R177	A1
R178	A1
R179	A1
R180	A1
R181	A1
R258	A8
R259	A8
R261	A8
R262	A8
R263	A5
R264	A4
R265	A5
R266	A7
R268	A6
R290**	D4
R291**	D4
R292**	D4
R293**	D4
R303	B2
R304	B2
R305	B2
R306	B2
R307	B1
R308	C1
R309	C1
R310	C1
R311	C1
R312	B1
R314	A7
R315	A7
R316	A7
R400	A1
R404	D6
R405	D6
R406	D6
R427	D4
R439**	C2
R440	A7
R441	A7
R444	B2
R449	A2
R450	A1
R451	A1
R452	A1
R469	D7
R470**	D6
R471	D6
R472	D6
R473	D6
R474**	D4
R475	A5
R478*	B8
R479*	B8
R480*	B8
R481*	B8
R482*	B8
R483*	B8
R484*	C8
R485*	C8
R486*	C8
R487*	B8
R488*	B8
R489*	C8
R490**	A6
R491**	A2
R494	C5
R495	A5
R496**	A5
R497	A3
R499	C6
R500	C2
R501	B1
R502	B1
R503	C3
R504	C3
R505	C3
R511**	D3
R516	A2
R519	A7
R520	B7
R521	B6
R524**	B8
R530	C6
R531	D8
R532	C6
R533	C6
R534	D8
R535	A1
R536	A8
R537	A8
R538	A8
R543	B8
R544	B8
R550*	D3
R551**	D3
R552*	D3
R553**	D3
R554**	D3
R555**	D3
R556**	D2
R558	A8
R559	A8
R560	A8
R562	A5
R563	A7
R564	D8
R565	D8
R566	D8
R567	D8
R568	D7
R569	C6
R570	C6
R571	C6
R572	C6
R573	C6
R574	C6
R575	C6
R576	C6
R577	C6
R578	C6
R579	B5
R580	D6
R581	C5
R582	D5
R588	B7
R589§	C8
R592**	C5
R593**	C5
R596	A6
R597	A5
R598	A5
R600	A5
R601	A6
R602	A6
R603	A4
R604	A4
R605	A4
R606	A4
R607	A4
R612	A4
R613	A4

ICS

U2	C4
U3	D4
U4	D2
U5	D2
U6	B5
U7	C7
U8	C8
U9	A5
U10	B3
U18	B1
U19B	A4
U19C	B1

MISC. COMPONENTS

IR1	D5
IR2**	D5
J5**	D2
J6	C6
J7	A6
J12**	C5
J13	C5
LED2**	D1
LED3**	D5
LED4**	D1
LED5**	D1
LED7**	D4
LED8**	D1
LED9	D1
LNB1	B8
LNB2	B8
MOD1	B8
S7	A6
S8	B6
S9	B6
S10	A4
S11	A8
S12	B4
S13	B5
SW2**	C5
SW3**	C5
SW4	C5
SW5	C4
SW6	C4
X1‡	C4
X2	B3
X7	B2

** not fitted on either receiver

* not fitted on single input receiver

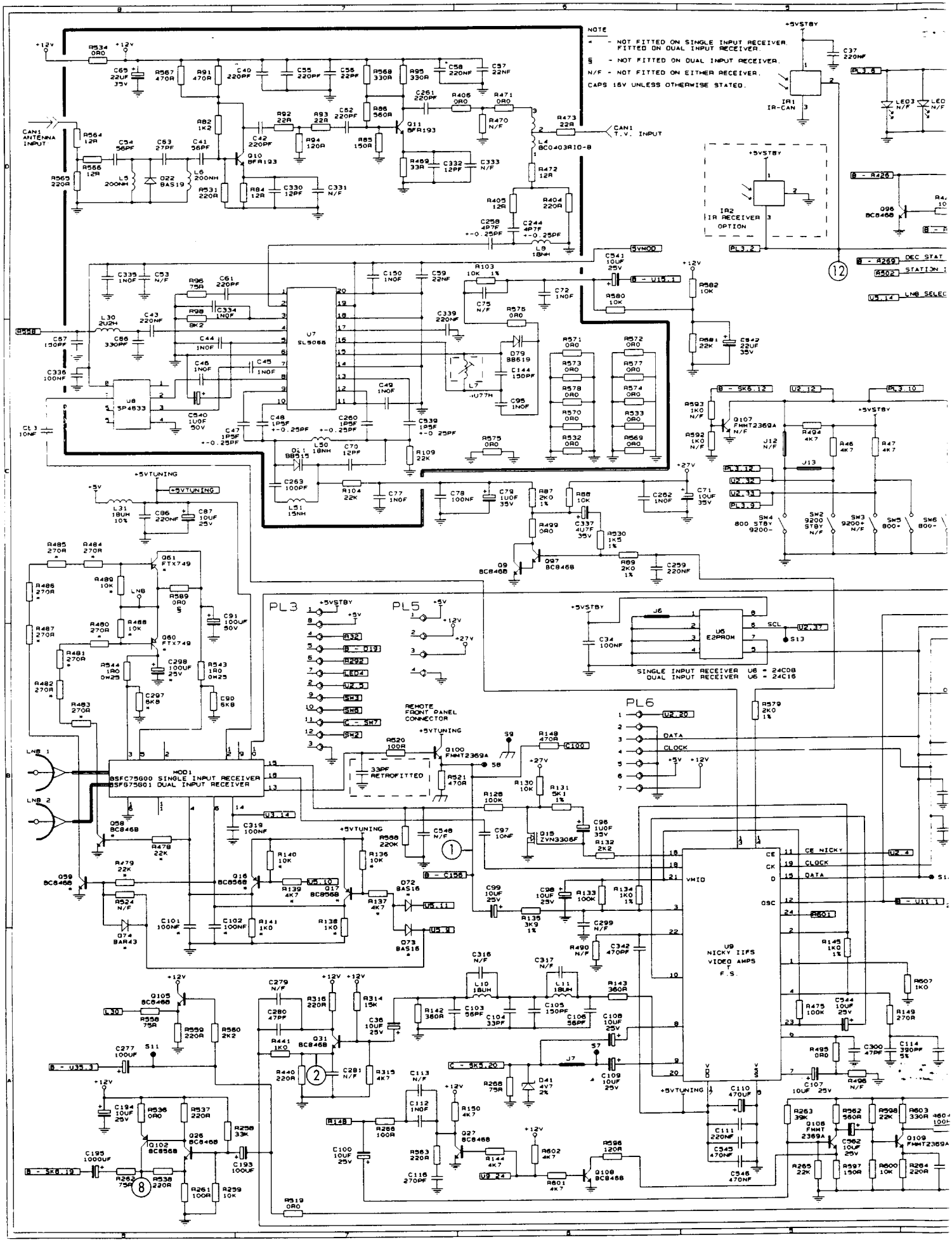
§ not fitted on dual input receiver

° actually a resistor (in a capacitor position)

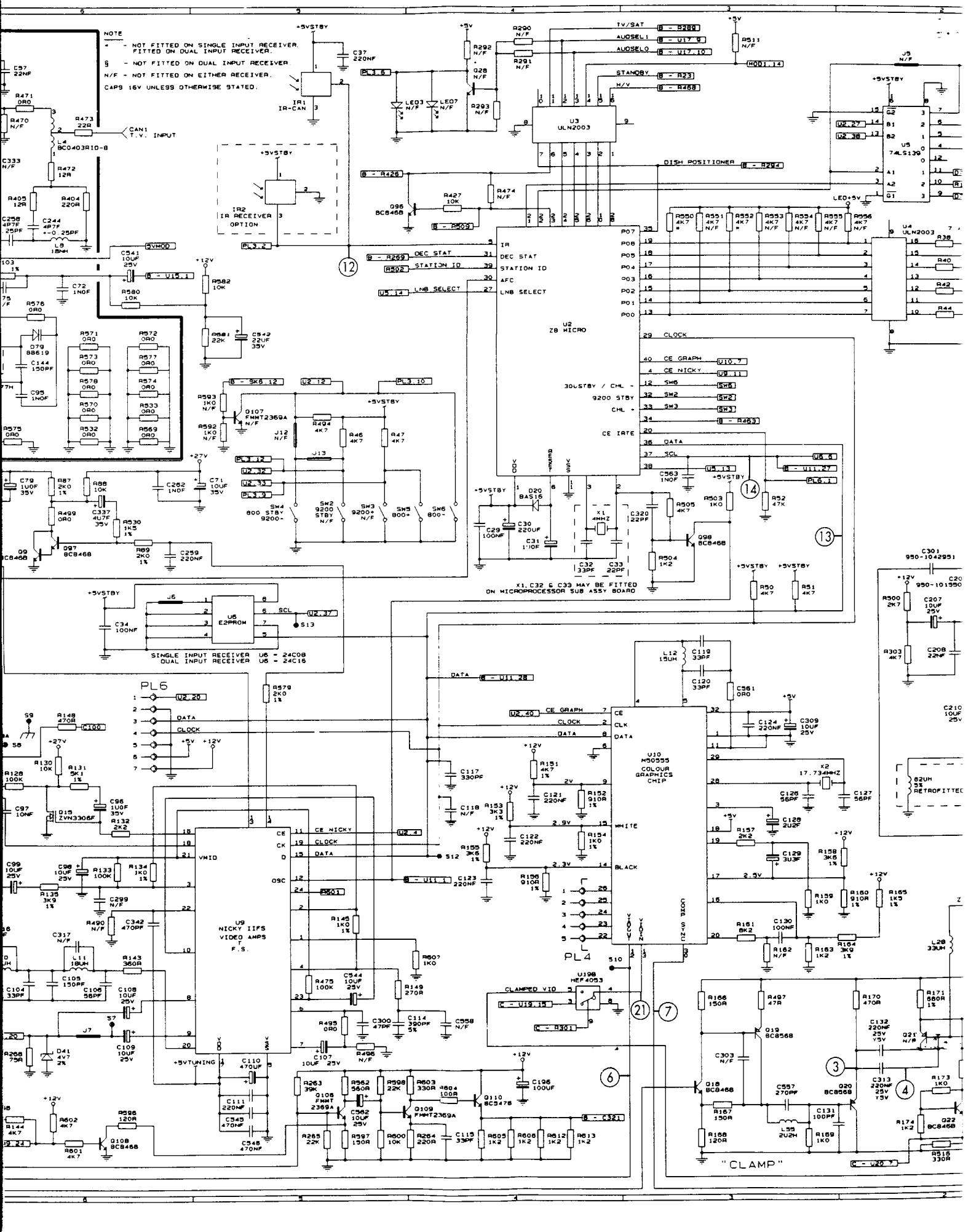
‡ may be mounted on µP sub-assembly board (NB: C32 as C5 and C33 as C6)

Retrofitted: 33 pF capacitor (B7)
82 µH inductor (B2)

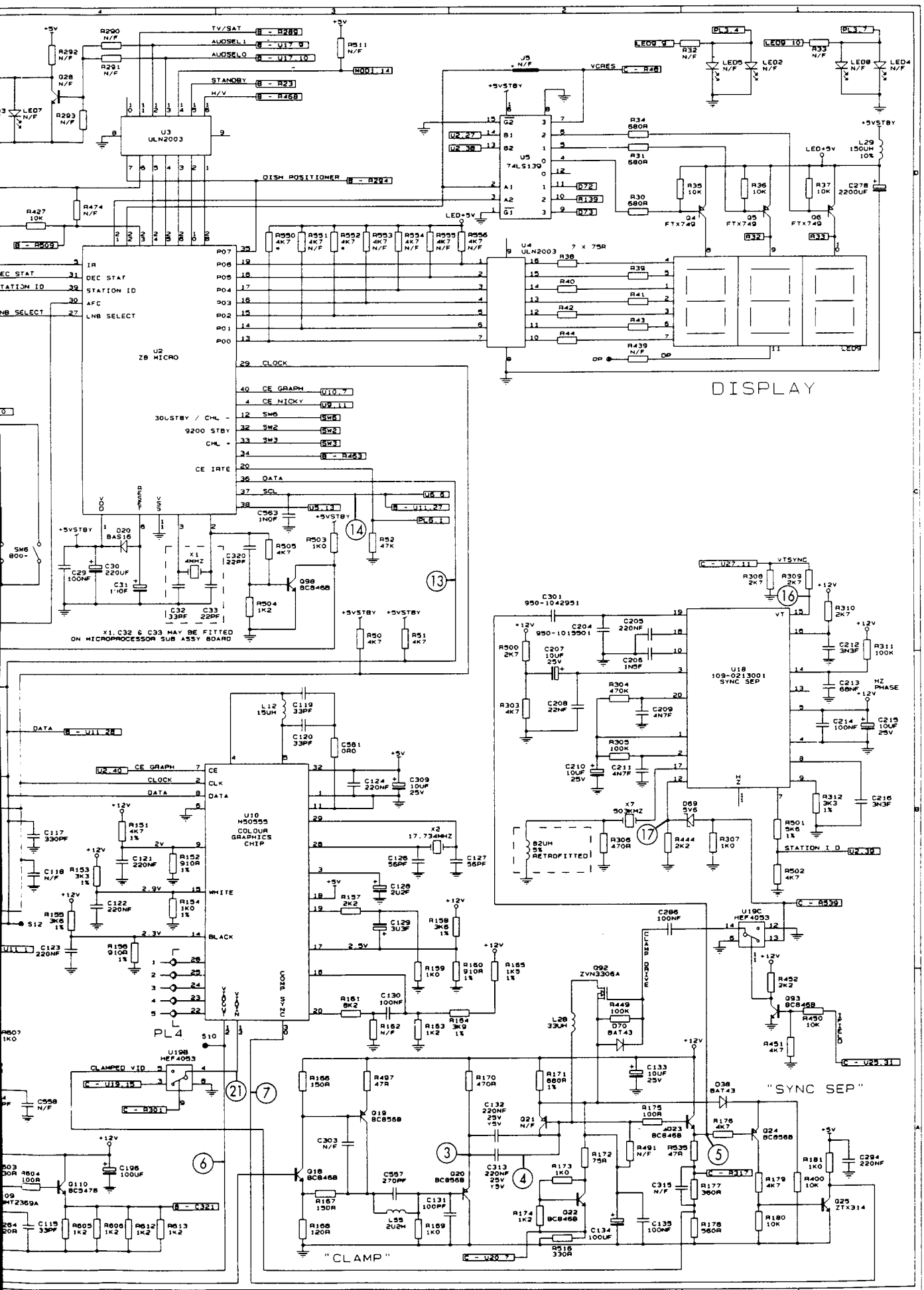
CIRCUIT DIAGRAM A - TUNER, VIDEO PROCESSING, CONTROL AND UHF MODULATOR CIRCUIT



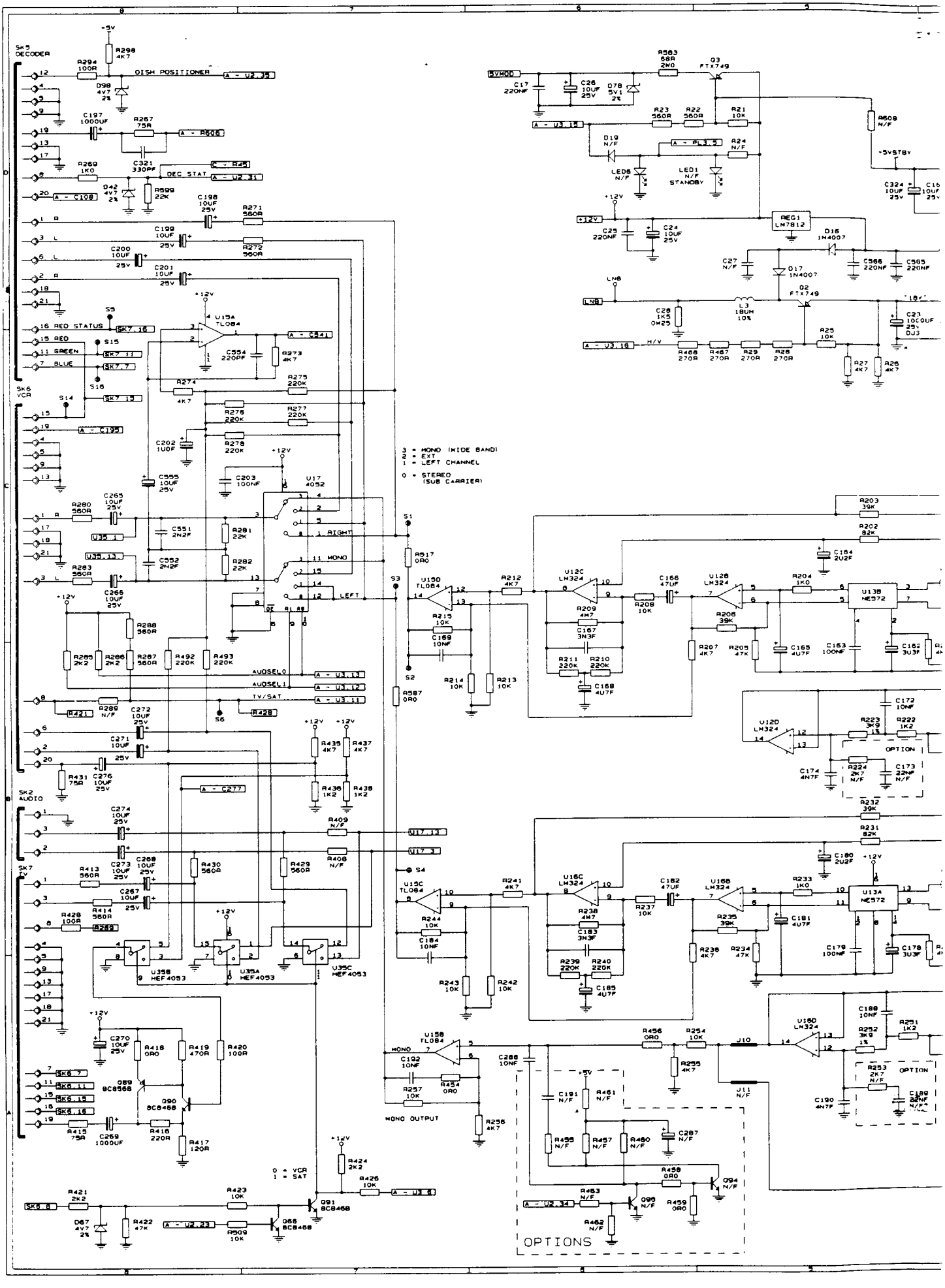
NG, CONTROL AND UHF MODULATOR CIRCUITRY



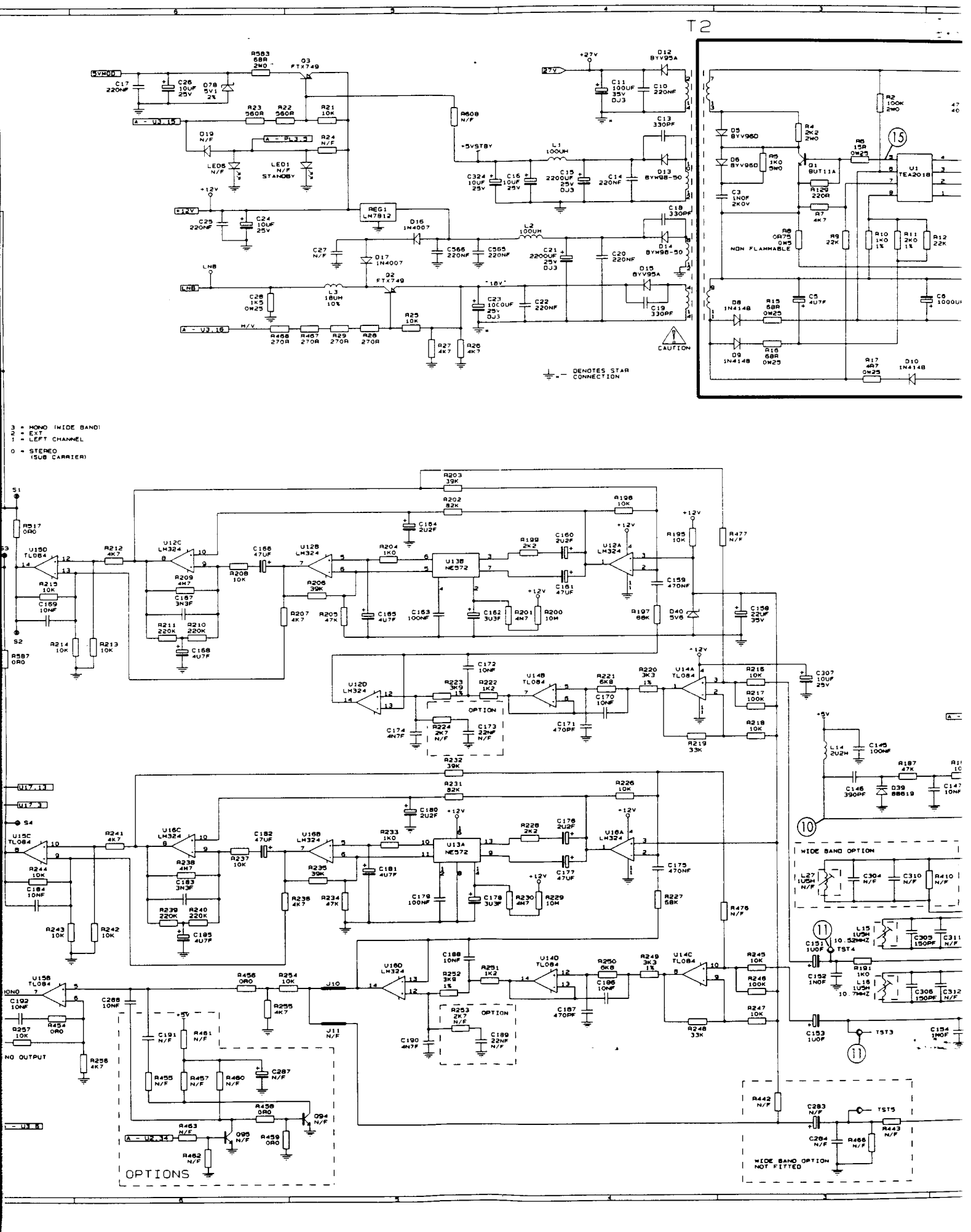
UITRY


DISPLAY
"SYNC SEP"
"CLAMP"
U2 Z8 MICRO
U10 M50555 COLOUR GRAPHICS CHIP
U18 109-0213001 SYNC SEP
U3 ULN2003
U4 ULN2003
U5 74LS139
PL4
X1, C32 & C33 MAY BE FITTED ON MICROPROCESSOR SUB ASSY 80ARD
82UH 5% RETROFITTED
DISH POSITIONER
STATION ID
CLAMPED VID
TV/SAT
AUDSEL1
AUDSEL0
STANDBY
H/V
LNB SELECT
CE GRAPH
CLOCK
DATA
WHITE
BLACK
VTSYNC
HZ PHASE

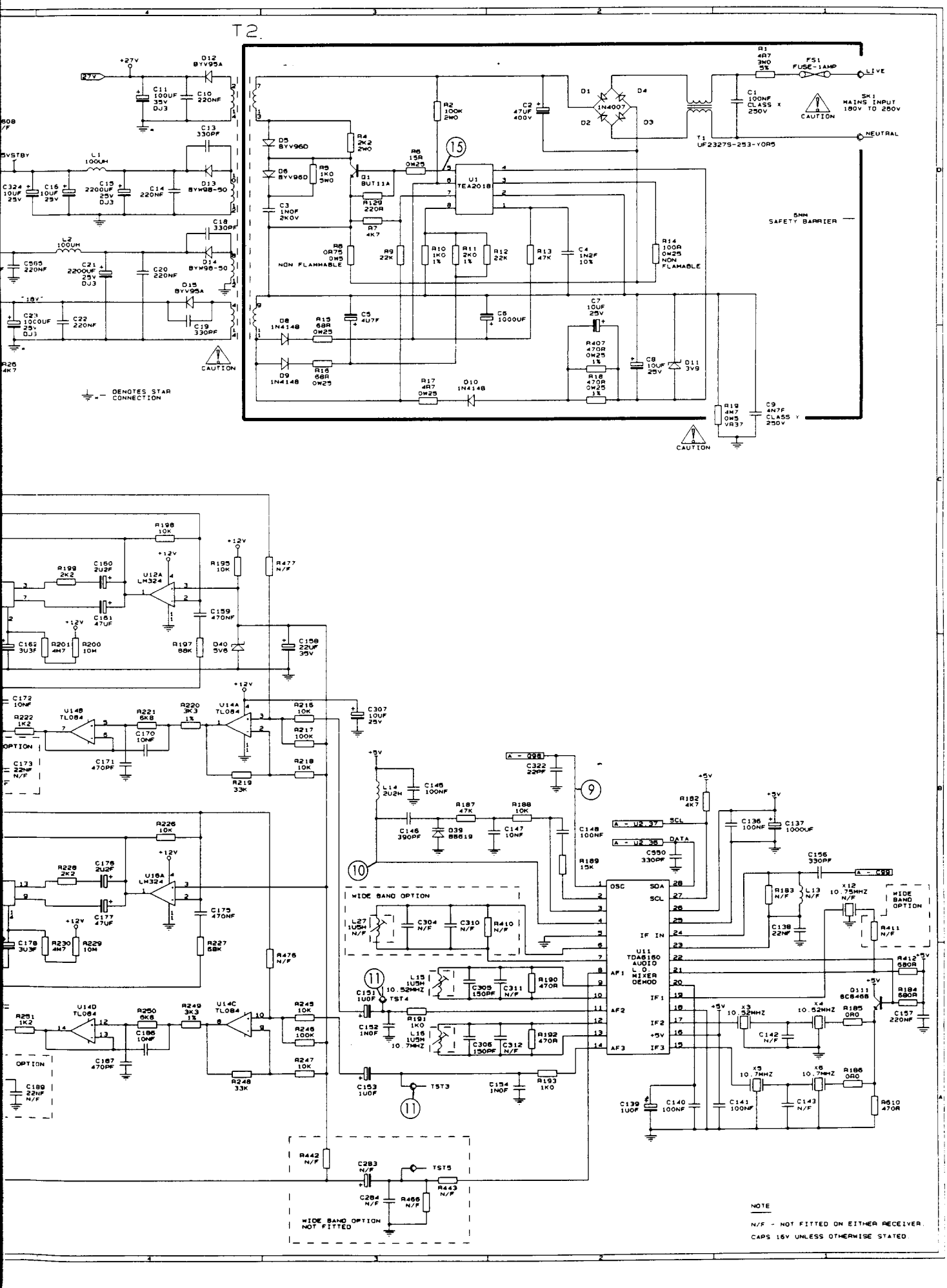
CIRCUIT DIAGRAM B - AUDIO PROCESSING, SIGNAL ROUTING, SCART CONNECTORS AND P



SING, SIGNAL ROUTING, SCART CONNECTORS AND POWER SUPPLY CIRCUITRY



AND POWER SUPPLY CIRCUITRY



GRID REFERENCES - CIRCUIT DIAGRAM B

CAPACITORS

C1	D1
C2	D2
C3	D3
C4	D2
C5	D3
C6	D2
C7	D2
C8	C2
C9	C1
C10	D4
C11	D4
C13	D4
C14	D4
C15	D4
C16	D4
C17	D6
C18	D4
C19	D4
C20	D4
C21	D4
C22	D4
C23	D5
C24	D6
C25	D6
C26	D6
C27**	D5
C28°	D6
C136	B1
C137	B1
C138	B1
C139	A2
C140	A2
C141	A1
C142**	A1
C143**	A1
C145	B3
C146	B3
C147	B2
C148	B2
C151	A3
C152	A3
C153	A3
C154	A2
C156	B1
C157	A1
C158	B3
C159	C4
C160	C4
C161	C4
C162	B5
C163	B5
C164	C5
C165	B5
C166	C6
C167	B6
C168	B6
C169	B7
C170	B4
C171	B4
C172	B5
C173**	B5
C174	B5
C175	B4
C176	B4
C177	B4
C178	A5
C179	A5
C180	B5
C181	B5
C182	B6
C183	B6
C184	A7
C185	A6
C186	A4
C187	A4
C188	A5
C189**	A5
C190	A5
C191**	A6
C192	A7
C197	D8
C198	D8
C199	D8
C200	D8
C201	D8
C202	C8
C203	C8
C265	C8
C266	C8
C267	B8
C268	B8
C269	A8
C270	A8
C271	B8
C272	B8
C273	B8
C274	B8
C276	B8
C283**	A3
C284**	A3
C287**	A6
C288	A6
C304**	B3
C305	A3
C306	A3
C307	B3
C310**	B3
C311**	A2
C312**	A2
C321	D8
C322	B2
C324	D5
C550	B2
C551	C8
C552	C8
C554	C7
C555	C8
C565	D5
C566	D5

DIODES

D1	D2
D2	D2
D3	D2
D4	D2
D5	D3
D6	D3
D8	C3
D9	C3
D10	C3
D11	C2
D12	D4
D13	D4
D14	D4
D15	D4
D16	D5
D17	D5
D19**	D6
D39	B3
D40	B4
D42	D8
D67	A8
D78	D6
D98	D8

INDUCTORS

L1	D4
L2	D4
L3	D5
L13**	B1
L14	B3
L15	A3
L16	A3
L27**	B3

TRANSISTORS

Q1	D3
Q2	D5
Q3	D5
Q66	A7
Q89	A8
Q90	A8
Q91	A7
Q94**	A5
Q95**	A6
Q111	A1

RESISTORS

R1	D1
R2	D3
R4	D3
R5	D3
R6	D3
R7	D3
R8	D3
R9	D3
R10	D3
R11	D3
R12	D2
R13	D2
R14	D2
R15	C3
R16	C3
R17	C3
R18	C2
R19	C1
R21	D5
R22	D6
R23	D6
R24**	D5
R25	C5
R26	C5
R27	C5
R28	C5
R29	C5
R129	D3
R182	B2
R183**	B1
R184	A1
R185	A1
R186	A1
R187	B3
R188	B2
R189	B2
R190	A2
R191	A3
R192	A2
R193	A2
R195	C4
R197	B4
R198	C4
R199	C4
R200	B4
R201	B4
R202	C5
R203	C5
R204	C5
R205	B5
R206	C5
R207	B6
R208	C6
R209	C6
R210	B6
R211	B6
R212	C6
R213	B6
R214	B6
R215	C7
R216	B3
R217	B3
R218	B3
R219	B4
R220	B4
R221	B4
R222	B5
R223	B5
R224**	B5
R226	B4
R227	A4
R228	B4
R229	A4
R230	A4
R231	B5
R232	B5
R233	B5
R234	A5
R235	B5
R236	B6
R237	B6
R238	B6
R239	A6
R240	A6
R241	B6
R242	A6
R243	A7
R244	B7
R245	A3
R246	A3
R247	A3
R248	A4
R249	A4
R250	A4
R251	A5
R252	A5
R253**	A5
R254	A5
R255	A6
R256	A6
R257	A7
R267	D8
R269	D8
R271	D7
R272	D7
R273	C7
R274	C8
R275	C7
R276	C8
R277	C7
R278	C8
R280	C8
R281	C8
R282	C8
R283	C8
R285	B8
R286	B8
R287	B8
R288	C8
R289**	B8
R294	D8
R298	D8
R407	C2
R408**	B7
R409**	B7
R410**	B2
R411**	B1
R412	A1
R413	B8
R414	B8
R415	A8
R416	A8
R417	A8
R418	A8
R419	A8
R420	A8
R421	A8
R422	A8
R423	A8
R424	A7
R426	A7
R428	B8
R429	B7
R430	B8
R431	B8
R435	B7
R436	B7
R437	B7
R438	B7
R442**	A3
R443**	A3
R454	A7
R455**	A6
R456	A6
R457**	A6
R458	A6
R459	A6
R460**	A6
R461**	A6
R462**	A6
R463**	A6
R466**	A3
R467	C5
R468	C6
R476**	A3
R477**	C3
R492	B8
R493	B8
R509	A8
R517	C7
R583	D6
R587	B7
R599	D8
R608**	D5
R610	A1

CONNECTORS

SK1	D1
SK2	B8
SK5	D8
SK6	C8
SK7	A8

ICS

U1	D3
U11	A2
U12A	C4
U12B	C5
U12C	C6
U12D	B5
U13A	B5
U13B	C5
U14A	B4
U14B	B4
U14C	A4
U14D	A4
U15A	C8
U15B	A7
U15C	B7
U15D	C7
U16A	B4
U16B	B5
U16C	B6
U16D	A5
U17	C7
U35A	B8
U35B	B8
U35C	B7

MISC. COMPONENTS

FS1	D1
J10	A5
J11**	A5
LED1**	D5
LED6**	D6
REG1	D5
S1	C7
S2	B7
S3	C7
S4	B7
S5	D8
S6	B8
S14	C8
S15	C8
S16	C8
T1	D2
T2	D4
TST3	A3
TST4	A3
TST5	A3
X3	A1
X4	A1
X5	A1
X6	A1
X12**	B1

* ** not fitted on either receiver
* * not fitted on single input receiver
* § not fitted on dual input receiver
* ° actually a resistor (in a capacitor position)

GRID REFERENCES - MAIN PCB

CAPACITORS

C1	A5
C2	B5
C3	B5
C4	B1†
C5	A5
C6	A5
C7	B5
C8	B5
C9	C4
C10	C1†
C11	C5
C13	C1†
C14	C1†
C15	C5
C16	C4
C17	B2†
C18	C1†
C19	C1†
C20	C1†
C21	C5
C22	C1†
C23	C5
C24	D5
C25	D1†
C26	B4
C27**	D1†
C28°	D5
C29	D2†
C30	D4
C31	D4
C32‡	D2†
C33‡	D2†
C34	D2†
C35	D4†
C36	A3
C37	D1†
C38**	C2†
C39**	C4
C40	A2†
C41	A2†
C42	A2†
C43	B2†
C44	B2†
C45	B2†
C46	B2†
C47	B2†
C48	B2†
C49	B2†
C53**	B2†
C54	A2†
C55	A2†
C56	A2†
C57	A2†
C58	A2†
C59	B2†
C61	B2†
C62	A2†
C63	A2†
C65	A4
C66	B2†
C67	B2†
C70	B2†
C71	B4
C72	B2†
C75**	B2†
C77	B2†
C78	B2†
C79	B4
C83	B3†
C86	B3†
C87	B3
C90°	A2†
C91	A3
C95	B2†
C96	B3
C97	B3†
C98	B3
C99	B3
C100	A3
C101*	A2†
C102*	A2†
C103	A3†
C104	B3†
C105	B3†
C106	B3†
C107	B3
C108	B3
C109	B3
C110	B3
C111	B3†
C112	A3†
C113**	A3†
C114	B3†
C115	A3†
C116	*A3†
C117	B3†
C118**	B3†
C119	B4†
C120	B4†
C121	C3†
C122	C3†
C123	C4†
C124	C3†
C125	C3
C126	B3†
C127	B3†
C128	B2
C129	C3
C130	C3†
C131	B3†
C132	B3†
C133	B3
C134	B3
C135	B3†
C136	B4†
C137	A2
C138	B4†
C139	B2
C140	B4†
C141	B4†
C142**	A4†
C143**	A4†
C144	B2†
C145	B4†
C146	B4†
C147	B4†
C148	B4†
C150	B2†
C151	B2
C152	B4†
C153	B2
C154	B4†
C156	A4†
C157	B4†
C158	B2
C159	C4†
C160	B1
C161	B1
C162	C1
C163	B5†
C164	B1
C165	B1
C166	B2
C167	B4†
C168	B1
C169	B5†
C170	B4†
C171	B4†
C172	B4†
C173**	B4†
C174	B4†
C175	B5†
C176	B1
C177	B1
C178	C1
C179	B5†
C180	B1
C181	B1
C182	B1
C183	B5†
C184	B5†
C185	B1
C186	B4†
C187	B4†
C188	B5†
C189**	B5†
C190	B5†
C191**	C5†
C192	A5†
C193	B2
C194	C1
C195	B2
C196	A3
C197	A3
C198	A2
C199	A2
C200	A2
C201	A2
C202	B1
C203	B5†
C204	D3†
C205	D3†
C206	C3†
C207	D4
C208	D3†
C209	D3†
C210	D4
C211	D3†
C212	D3†
C213	D3†
C214	D3†
C215	D4
C216	D3†
C219	C3†
C220	D4†
C221	C3
C222	C3†
C225	D3†
C227	C3†
C228	C3†
C229	C3†
C230	C3†
C231	C3
C232	C3†
C233	C3
C235	C4†
C236	C4†
C237**	C4†
C238	C4†
C239	C4†
C240	C4†
C241	C4†
C242	C4†
C243	D3†
C244	A2†
C245	D3†
C246	D4†
C247	D4†
C248	D4†
C249	D2
C250	D4†
C251	C4†
C252	C5†
C253	C5†
C254	C2
C255	D5†
C256	D5†
C257	D3
C258	B2†
C259	B2†
C260	B2†
C261	A2†
C262	B2†
C263	B2†
C265	A1
C266	A1
C267	A2
C268	A1
C269	A2
C270	B2
C271	A1
C272	A1
C273	A3
C274	A3
C276	A2
C277	B2
C278	D5
C279**	B3†
C280	B3†
C281**	B3†
C283**	B2
C284**	B4†
C286	C3†
C287**	B1
C288	C5†
C289	B1
C294	C3†
C297**	A2†
C298*	A3
C299**	B3†
C300	B3†
C301	D3†
C303**	B3†
C304**	B4†
C305	B4†
C306	B4†
C307	B2
C309	B3
C310**	B2
C311**	B2
C312**	B2
C313	B3†
C315**	C3†
C316**	B3†
C317**	B3†
C318	C2
C319	B2†
C320	D2†
C321	A3†
C322	B4†
C324	C4
C325	C3†
C326	C3†
C327	C3†
C330	A2†
C331**	A2†
C332	A2†
C333**	A2†
C334	B2†
C335	B2†
C336	B2†
C337	B4
C339	B2†
C340	C4†
C341**	C4†
C342	B3†
C539	B2†
C540	B4
C541	B4
C542	B4
C544	B3
C545	B3†
C546	B3†
C548**	B2†
C549	C4†
C550	B4†
C551	B5†
C552	B5†
C553	C3†
C554	B5†
C555	B1
C556°	C5†
C557	B3†
C558**	B3†
C559	C3†
C560**	C3†
C561°	C4†
C562	A3
C563	D2†
C564**	C3†
C565	D1†
C566	D1†
C567	C5†

DIODES

D1	B5
D2	B5
D3	B5
D4	B5
D5	B4
D6	B4
D8	B4
D9	B4
D10	B5
D11	B5
D12	C5
D13	C5
D14	C5
D15	C5
D16	D5
D17	D5
D19**	C4
D20	D2†
D21	B2†
D22	A2†
D29**	C2†
D30**	C2†
D31**	C4
D32**	C4
D38	B3
D39	B4†
D40	B2
D41	B3
D42	A3
D43	C3
D44	C3
D48**	C4†
D49	C4†
D50	C4†
D51	D4†
D52	C2
D53	C2
D54	C2
D55	C2
D56	D5†
D57	D5†
D58	D5†
D59	C1
D60	C5†
D61	C5†
D62	D2
D63	D2
D64	D5†
D65	D5†
D66	C1
D67	A1
D69	D3
D70	C3
D72*	C2†
D73*	B2†
D74*	A2†
D75**	C4
D76	C3
D77	D3
D78	B4
D79	B2†
D80**	C2†
D96	C5†
D97	C5†
D98	A3
D100	C3†
D101**	C2†

INDUCTORS

L1	C4
L2	D5
L3	D5
L4	A4
L5	A4
L6	A4
L7	B4
L8	B4
L10	B3
L11	B3
L12	B2
L13**	A2
L14	B2
L15	B2
L16	B2
L19	C3
L20	D3
L21	C3
L22	C3
L23	C3
L24	C3
L25	C2
L26	D2
L27**	B2
L28	C3
L29	D5
L30	B4
L31	B4
L50	B4
L51	B4
L52	C2
L53	C2
L54	C2
L55	B3

CONNECTORS

PL1	C1
PL2**	C3
PL3	D4
PL4	C3
PL5	D5
PL6	B3
SK1	A5
SK2	A3
SK5	A3
SK6	A1
SK7	A2

TRANSISTORS

Q1	B5
Q2	D5
Q3	C4
Q4	D4
Q5	D5
Q6	D5
Q7	D4†
Q8	D4†
Q9	B2†
Q10	A2†
Q11	A2†
Q15	B3†
Q16*	A2†
Q17*	A2†
Q18	B3†
Q19	B3†
Q20	B3†
Q21**	C3†
Q22	B3†
Q23	C3†
Q24	C3†
Q25	C3
Q26	B4†
Q27	A3†
Q28**	D3†
Q30	B3†
Q31	B3†
Q32	C3†
Q33	C3†
Q34	C3†
Q35	D5†
Q36	D5†
Q37	D5†
Q38	D5†
Q39	C5†
Q40	C5†
Q41	C5†
Q42	C1
Q43	D2
Q44	D5†
Q45	D5†
Q46**	C2†
Q47**	C2†
Q48**	C2†
Q49**	C2†
Q50**	C2†
Q51**	C2†
Q52**	C2†
Q53**	C2†
Q58*	A3†
Q59*	B2†
Q60*	A3
Q61*	A3
Q66	A5†
Q89	B4†
Q90	B4†
Q91	A5†
Q92	C3
Q93	C3†
Q94**	B5†
Q95**	B5†
Q96	C2†
Q97	B2†
Q98	D2†
Q99	C3†
Q100	A3†
Q102	B4†
Q103	C2
Q104	C3†
Q105	B3†
Q106	A3†
Q107**	D5†
Q108	A3†
Q109	A3†
Q110	A3
Q111	A4†

RESISTORS

R1	A5
R2	B5
R4	B5
R5	B5
R6	A5
R7	A1†
R8	B5
R9	B2†
R10	A1†
R11	A1†
R12	A1†
R13	A1†
R14	B5
R15	A4
R16	A4
R17	B5
R18	B5
R19	B4
R21	D1†
R22	C2†
R23	C2†
R24**	C2†
R25	D1†
R26	C1†
R27	C1†
R28	D1†
R29	D1†
R30	D2†
R31	D2†
R32**	D1†
R33**	D2†
R34	D2†
R35	D2†
R36	D1†
R37	D1†
R38	D2†
R39	D2†
R40	D2†
R41	D2†
R42	D2†
R43	D2†
R44	D2†
R45	B3†
R46	D2†
R47	D2†
R48	D4†
R49	D4†
R50	C2†
R51	D2†
R52	C2†
R53**	C2†
R54**	C2†
R55**	C2†
R56**	C2†
R57**	C2†
R58**	C2†
R59**	C2†
R60**	C2†
R61**	C2†
R62**	C2†
R63**	C2†
R64**	C2†
R65**	C2†
R66**	C2†
R67**	C2†
R68**	C2†
R69**	C2†
R70**	C2†
R71**	C2†
R72**	C2†
R73**	C2†
R74**	C2†
R75**	C2†
R76**	C2†
R77**	C2†
R78**	C2†
R79**	C2†
R80**	C2†
R81**	C3†
R82	A2†
R84	A2†
R85	A2†
R86	A2†
R87	B2†
R88	B2†
R89	B2†
R91	A2†
R92	A2†
R93	A2†
R94	A2†
R95	A2†
R96	B2†
R98	B2†
R103	B2†
R104	B2†
R109	B2†
R113	D4†
R128	B2†
R129	B1†
R130	B2†
R131	B2†
R132	B3†
R133	B3†
R134	B3†
R135	B3†
R136*	A2†
R137*	B2†
R138*	A2†
R139*	B2†
R140*	A2†
R141*	A2†
R142	A3†
R143	B3†
R144	A3†
R145	B3†
R148	A3†
R149	B3†
R150	A3†
R151	C3†
R152	C4†
R153	C3†
R154	C4†
R155	C3†
R156	C4†
R157	C3†
R158	C3†
R159	C3†
R160	C3†
R161	C3†
R162**	C3†
R163	C3†
R164	C3†
R165	C3†
R166	B3†
R167	B3†
R168	B3†
R169	B3†
R170	B3†
R171	B3†
R172	B3†
R173	B3†
R174	B3†
R175	C3†
R176	C3†
R177	C3†
R178	B3†
R179	C3†
R180	C3†
R181	C3†
R182	B3†
R183**	A4†
R184	A4†
R185	A4†
R186	A4†
R187	B4†
R188	B4†
R189	B4†
R190	B4†
R191	B4†
R192	B4†
R193	B4†
R195	B4†
R197	C4†
R198	B4†
R199	B5†
R200	C5†
R201	C5†
R202	B5†
R203	B4†
R204	B5†
R205	B4†
R206	B4†
R207	B5†
R208	B4†
R209	B4†
R210	B4†
R211	B4†
R212	B5†
R213	B5†
R214	B5†
R215	B5†
R216	B4†
R217	B4†
R218	B4†
R219	B4†
R220	B4†
R221	B4†
R222	B4†
R223	B4†
R224**	B4†
R226	B5†
R227	B5†
R228	B5†
R229	C5†
R230	C5†
R231	B5†
R232	B5†
R233	B5†
R234	B5†
R235	B5†
R236	B5†
R237	B5†
R238	B5†
R239	B5†
R240	B5†
R241	B5†
R242	B5†
R243	B5†
R244	A5†
R245	B4†
R246	B4†
R247	B4†
R248	B4†
R249	B4†
R250	B4†
R251	B4†
R252	B5†
R253**	B5†
R254	B5†
R255	B5†
R256	A5†
R257	A5†
R258	B4†
R259	B4†
R261	B4†
R262	B4†
R263	A3†
R264	A3†
R265	A3†
R266	B3†
R267	A3†
R268	B3†
R269	A3†
R271	B5†
R272	B5†
R273	B5†
R274	B5†
R275	B5†
R276	B5†
R277	B5†
R278	B5†
R280	A5†
R281	B5†
R282	B5†
R283	A5†
R285	D3†
R286	D3†
R287	A5†
R288	A5†
R289**	A5†
R290**	D3†
R291**	D3†
R292**	D3†
R293**	D3†
R294	A3†
R296	D4†
R298	B3†
R299	B4†
R300	B3†
R301	B3†
R303	D3†
R304	D3†
R305	D3†
R306	D3†
R307	D3†
R308	D3†
R309	D3†
R310	D3†
R311	D3†
R312	D3†
R313**	D4†
R314	A3†
R315	A3†
R316	B3†
R317	C3†
R318	C3†
R320	C3†
R321	D4†
R323	C3†
R324	C4†
R325	C3†
R326	C3†
R327	C3†
R328	C3†
R329	C3†
R330	C3†
R331	C3†
R332**	C4†
R333	C4†
R334	C4†
R335	D3†
R336	D3†
R337	D3†
R338	C3†
R339	D3†
R340	D3†
R341	D3†
R342	D3†
R343	D3†
R345	C4†
R346	C4†
R347	C4†
R348	D4†
R349	D4†
R350	D4†
R351	D4†
R352	D4†
R353	D4†
R354	D4†
R355	C4†
R356	D4†
R357	D4†
R358	D4†
R359	D3†
R360	D4†
R361	C4†
R362	C5†
R363	C5†
R364	C5†
R365	C5†
R366	C5†
R367	C5†
R368	C5†
R369	C5†
R370	C5†
R371	C5†
R372	D5†
R373	D5†
R374	D5†
R375	D5†
R376	D5†
R377	D5†
R378	D5†
R379	D5†
R380	D5†
R381	D5†
R382	D5†
R383	C5†
R384**	C5†
R385	D5†
R386	C5†
R387	C5†
R388	C5†
R389	C5†
R390	C5†
R391	C5†
R392	C5†
R393	C5†
R394	D5†
R395	D5†
R396	D5†
R397	D5†
R398	D5†
R399	D5†
R400	C3†
R404	A2†
R405	A2†
R406	A2†
R407	B5
R408**	B4†
R409**	B4†
R410**	B4†
R411**	A4†
R412	A4†
R413	A4†
R414	A4†
R415	A4†
R416	B4†
R417	B4†
R418	B4†
R419	B4†
R420	B4†
R421	A5†
R422	A5†
R423	A5†
R424	B5†
R426	C2†
R427	C2†
R428	A4†
R429	B4†
R430	B4†
R431	A4†
R435	A4†
R436	A4†
R437	A4†
R438	A4†
R439**	D2†
R440	B3†
R441	B3†
R442**	B4†
R443**	B4†
R444	D3†
R449	C3†
R450	C3†
R451	C3†
R452	C3†
R454	A5†
R455**	C5†
R456	B5†
R457**	C5†
R458	B5†
R459	B5†
R460**	C5†
R461**	C5†
R462**	B5†
R463**	C4†
R464	C5†
R465	C5†
R466**	B4†
R467	D1†
R468	D1†
R469	A2†
R470**	A2†
R471	A2†
R472	A2†
R473	A2†
R474**	C2†
R475	B3†
R476**	B4†
R477**	B4†
R478*	A2†
R479*	A2†
R480*	A3†
R481*	A3†
R482*	A3†
R483*	A3†
R484*	B3†
R485*	B3†
R486*	B3†
R487*	B3†
R488*	A3†
R489*	A3†
R490**	B3†
R491**	B3†
R492	B5†
R493	B5†
R494	D2†
R495	B3†
R496**	B3†
R497	B3†
R499	B2†
R500	D3†
R501	D2†
R502	D2†
R503	D2†
R504	D2†
R505	D2†
R509	A5†
R511**	B3†
R512	C3†
R513	C3†
R514	C3†
R515	C3†
R516	B3†
R517	B5†
R519	B4†
R520	A2†
R521	A3†
R522	C3†
R523	C3†
R524**	A2†
R530	B2†
R531	A2†
R532	B2†
R533	B2†
R534	A2†
R535	B3†
R536	B4†
R537	B4†
R538	B4†
R539	C4†
R540	C4†
R541	C5†
R542	C3†
R543	A3
R544	A3
R545	C3†
R546	C3†
R547	C3†
R548	C5†
R550*	C2†
R551**	C2†
R552*	C2†
R553**	C2†
R554**	C2†
R555**	C2†
R556**	C2†
R557	D3†
R558	B3†
R559	B3†
R560	B3†
R562	A3†
R563	A3†
R564	A2†
R565	A2†
R566	A2†
R567	A2†
R568	A2†
R569	B2†
R570	B2†
R571	B2†
R572	B2†
R573	B2†
R574	B2†
R575	B2†
R576	B2†
R577	B2†
R578	A2†
R579	B2†
R580	B2†
R581	B2†
R582	B2†
R583	C4
R584	D4†
R585	D4†
R586	C4†
R587	A5†
R588	B2†
R589§	A3†
R590	C3†
R591	C2†
R592**	D5†
R593**	D5†
R594	C3†
R595	D3†
R596	A3†
R597	A3†
R598	A3†
R599	A3†
R600	A3†
R601	A3†
R602	B3†
R603	A3†
R604	A3†
R605	A3†
R606	A3†
R607	B3†
R608**	C2†
R609	D5†
R610	A4†
R612	A3†
R613	A3†

ICS

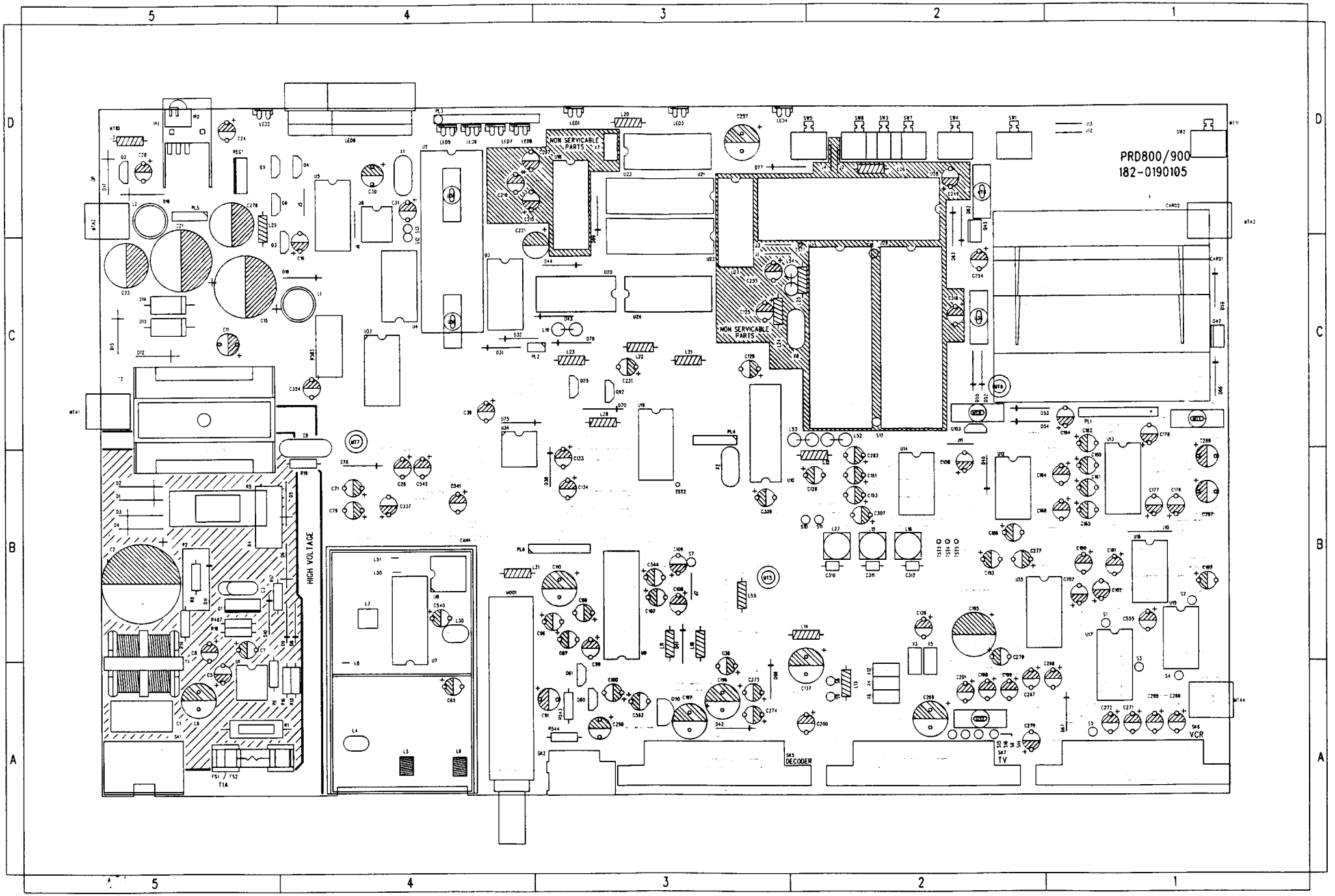
U1	A5
U2	D4
U3	C4
U4	C4
U5	D4
U6	D4
U7	B4
U8	B4
U9	B3
U10	C3
U11	B4†
U12	B2
U13	B1
U14	B2
U15	B1
U16	B1
U17	B1
U18	D3
U19	C3
U20	C3
U21	D3
U22	C3
U23	D3
U24	C3
U25	C2
U26	C5†
U27	D3
U28	D2
U29	C2
U30	D4†
U31	C4†
U32	C4†
U33**	C4
U34**	C4
U35	B2

MISC. COMPONENTS

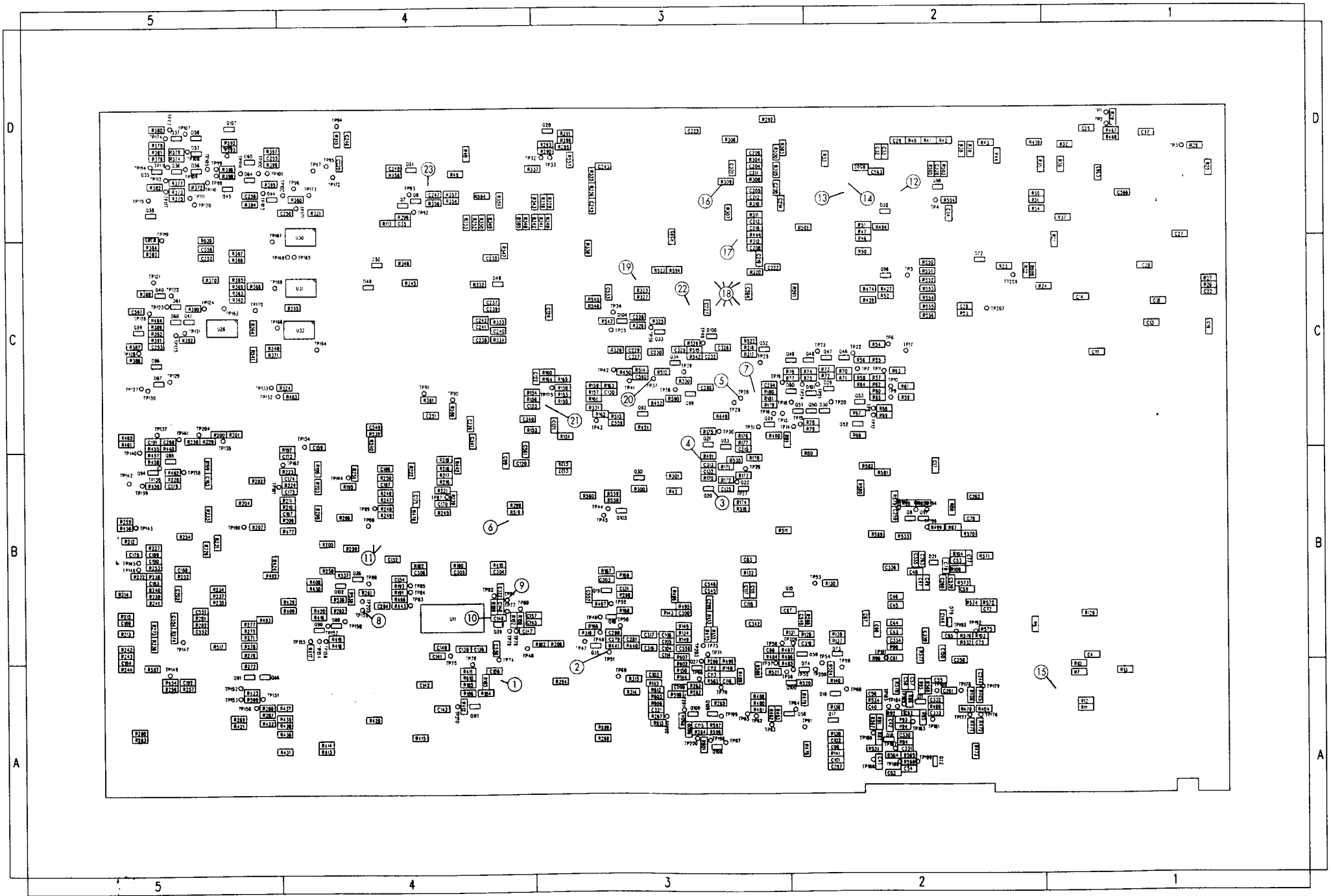
CAN1	B4
CARD1	C1
FS1	A5
IR1	D5
IR2**	D5
J1	C3
J2	D2
J3	C3
J4	D2
J5**	D4
J6	D4
J7	B3
J10	B1
J11**	C2
J12**	D1
J13	D1
LED1**	D3
LED2**	D5
LED3**	D3
LED4**	D3
LED5**	D4
LED6**	D4
LED7**	D4
LED8**	D4
LED9	D4
MOD1	B4
MT1	C1
MT5	B3
MT6	D2
MT7	C4
MT8	C2
MT9	C2
MT10	D5
MT11	D1
MTA1	C5
MTA2	D5
MTA3	D1
MTA4	A1
REG1	D5
S1	B1
S2	B1
S3	A1
S4	A1
S5	A1
S6	A2
S7	B3
S8	A2
S9	A2
S10	B2
S11	B2
S12	D4
S13	D4
S14	A2
S15	A2
S16	A2
S17	C2
S18	C2
SW1**	D2
SW2**	D1
SW3**	D2
SW4	D2
SW5	D2
SW6	D2
SW7	D2
T1	B5
T1A	A5
T2	C5
TST1	C2
TST2	B3
TST3	B2
TST4	B2
TST5	B2
X1‡	D4
X2	B3
X3	B2
X4	A2
X5	B2
X6	A2
X7	D3
X8	C2
X12**	A2

** not fitted on either receiver
* not fitted on single input receiver
§ not fitted on dual input receiver
° actually a resistor (in a capacitor position)
† mounted on copper side of PCB
‡ may be mounted on µP sub-assembly board (NB: C32 as C5 and C33 as C6)

MAIN PRINTED CIRCUIT BOARD - COMPONENT SIDE



MAIN PRINTED CIRCUIT BOARD - COPPER SIDE (SURFACE MOUNT COMPONENTS)



SPARES - PARTS LIST

ELECTRICAL PARTS COMMON TO SINGLE AND DUAL INPUT RECEIVERS

Capacitors

C1	CLASS X CAP-100NF 250V 20%	159-1048780
C2	47UF400V 7.5/10MM RADIAL ELECT CAP	155-4769780
C3	CER CAP 1NF 2KV 7.5MM 10% HR SERIES (TR)	159-1029651
C4	SMD 1.2NF 50V 10% CER X7R CAP 0805 (TRS)	950-1225621
C5	22UF16V 5MMRADIAL ELECT' CAPTR	155-2261751
C6	1000UF 16V 5MM RAD ELEC' CAP (10X16)	155-1081750
C7	10UF25V 5MMRADIAL ELECT' CAPTR	155-1062751
C8	10UF25V 5MMRADIAL ELECT' CAPTR	155-1062751
C9	"A" CLASS Y CAP-4N7 250V 20%	159-4728781
C10	SMD 220NF 50V 20/80% CER Y5V CAP 0805 TR	950-2245951
C11	100UF 35V DJ3RADIAL ELECT' CAP	855-1073951
C13	SMD 330PF 50V 10% CER COG CAP 0805 (TRS)	950-3315601
C14	SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR	950-2242951
C15	2200UF 25V DJ3RADIAL ELECT' CAP	855-2282960
C16	10UF25V 5MMRADIAL ELECT' CAPTR	155-1062751
C17	SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR	950-2242951
C18	SMD 330PF 50V 10% CER COG CAP 0805 (TRS)	950-3315601
C19	SMD 330PF 50V 10% CER COG CAP 0805 (TRS)	950-3315601
C20	SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR	950-2242951
C21	2200UF 25V DJ3RADIAL ELECT' CAP	855-2282960
C22	SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR	950-2242951
C23	1000UF 25V DJ3 RADIAL ELECT CAP 5MM TR	855-1082951
C24	10UF25V 5MMRADIAL ELECT' CAPTR	155-1062751
C25	SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR	950-2242951
C26	10UF25V 5MMRADIAL ELECT' CAPTR	155-1062751
C28	1K50.25W 5% CARBON FILM RES TR	140-1522501
C29	SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR	950-1042951
C30	220UF 16V 5MMRADIAL ELECT' CAPTR	155-2271751
C31	1UF16V 5MMRADIAL ELECT' CAPTR	155-1051751
C34	SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR	950-1042951
C35	SMD 10NF 50V 10% CER X7R CAP 0805 (TRS)	950-1035621
C36	10UF25V 5MMRADIAL ELECT' CAPTR	155-1062751
C37	SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR	950-2242951
C40	SMD 220PF 50V 5% CER COG CAP 0805 (TRS)	950-2215501
C41	SMD 56PF 50V 5% CER COG CAP 0805 (TRS)	950-5605501
C42	SMD 220PF 50V 5% CER COG CAP 0805 (TRS)	950-2215501
C43	SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR	950-2242951
C44	SMD 1NF 50V 5% CER COG CAP 0805 (TRS)	950-1025501
C45	SMD 1NF 50V 5% CER COG CAP 0805 (TRS)	950-1025501
C46	SMD 1NF 50V 5% CER COG CAP 0805 (TRS)	950-1025501
C47	SMD 1.5PF 50V +-0.25PF CER COG CAP 0805	950-0155301
C48	SMD 1.5PF 50V +-0.25PF CER COG CAP 0805	950-0155301
C49	SMD 1NF 50V 5% CER COG CAP 0805 (TRS)	950-1025501
C54	SMD 56PF 50V 5% CER COG CAP 0805 (TRS)	950-5605501
C55	SMD 220PF 50V 5% CER COG CAP 0805 (TRS)	950-2215501
C56	SMD 22PF 50V 5% CER COG CAP 0805 (TRS)	950-2205501
C57	SMD 22NF 50V 10% CER X7R CAP 0805 (TRS)	950-2235621
C58	SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR	950-2242951
C59	SMD 22NF 50V 10% CER X7R CAP 0805 (TRS)	950-2235621
C61	SMD 220PF 50V 5% CER COG CAP 0805 (TRS)	950-2215501
C62	SMD 220PF 50V 5% CER COG CAP 0805 (TRS)	950-2215501
C63	SMD 27PF 50V 5% CER COG CAP 0805 (TRS)	950-2705501
C65	22UF 35V 5MM 20% MINI RAD ELEC' CAPTR	156-2263751
C66	SMD 330PF 50V 10% CER COG CAP 0805 (TRS)	950-3315601
C67	SMD 150PF 50V 5% CER COG CAP 0805 (TRS)	950-1515501
C70	SMD 12PF 50V 5% CER COG CAP 0805 (TRS)	950-1205501
C71	10UF35V 2MMRADIAL ELECT' CAP	155-1063720
C72	SMD 1NF 50V 5% CER COG CAP 0805 (TRS)	950-1025501
C77	SMD 1NF 50V 5% CER COG CAP 0805 (TRS)	950-1025501
C78	SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR	950-1042951
C79	1UF35V 5MMRADIAL ELECT' CAPTR	155-1053751
C83	SMD 10NF 50V 10% CER X7R CAP 0805 (TRS)	950-1035621
C86	SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR	950-2242951
C87	10UF25V 5MMRADIAL ELECT' CAPTR	155-1062751
C90	SMD 6K80.1W5% RES 0805 (TRS)	940-6820501
C91	100UF 50V 5MM 20% RAD ELEC CAP	155-1075751
C95	SMD 1NF 50V 5% CER COG CAP 0805 (TRS)	950-1025501
C96	1UF35V 5MMRADIAL ELECT' CAPTR	155-1053751
C97	SMD 10NF 50V 10% CER X7R CAP 0805 (TRS)	950-1035621
C98	10UF25V 5MMRADIAL ELECT' CAPTR	155-1062751
C99	10UF25V 5MMRADIAL ELECT' CAPTR	155-1062751
C100	10UF25V 5MMRADIAL ELECT' CAPTR	155-1062751
C103	SMD 56PF 50V 5% CER COG CAP 0805 (TRS)	950-5605501
C104	SMD 33PF 50V 5% CER COG CAP 0805 (TRS)	950-3305501
C105	SMD 150PF 50V 5% CER COG CAP 0805 (TRS)	950-1515501
C106	SMD 56PF 50V 5% CER COG CAP 0805 (TRS)	950-5605501
C107	10UF25V 5MMRADIAL ELECT' CAPTR	155-1062751
C108	10UF25V 5MMRADIAL ELECT' CAPTR	155-1062751
C109	10UF25V 5MMRADIAL ELECT' CAPTR	155-1062751
C110	470UF 16V 5MMRADIAL ELECT' CAPTR	155-4771751
C111	SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR	950-2242951
C112	SMD 1NF 50V 5% CER COG CAP 0805 (TRS)	950-1025501
C114	SMD 390PF 50V 5% CER COG CAP 0805 (TRS)	950-3915501
C115	SMD 33PF 50V 5% CER COG CAP 0805 (TRS)	950-3305501
C116	SMD 270PF 50V5% CER.CAP 0805 (TRS)	950-2715501
C117	SMD 330PF 50V 10% CER COG CAP 0805 (TRS)	950-3315601
C119	SMD 33PF 50V 5% CER COG CAP 0805 (TRS)	950-3305501
C120	SMD 33PF 50V 5% CER COG CAP 0805 (TRS)	950-3305501
C121	SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR	950-2242951
C122	SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR	950-2242951
C123	SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR	950-2242951
C124	SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR	950-2242951
C125	10UF25V 5MMRADIAL ELECT' CAPTR	155-1062751
C126	SMD 56PF 50V 5% CER COG CAP 0805 (TRS)	950-5605501
C127	SMD 56PF 50V 5% CER COG CAP 0805 (TRS)	950-5605501
C128	2.2UF 16V 5MMRADIAL ELECT' CAPTR	155-2251751
C129	3.3UF 16V 5MMRADIAL ELECT' CAPTR	155-3351751
C130	SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR	950-1042951
C131	SMD 100PF 50V 5% CER COG CAP 0805 (TRS)	950-1015501
C132	SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR	950-2242951
C133	10UF25V 5MMRADIAL ELECT' CAPTR	155-1062751
C134	100UF 16V 5MMRADIAL ELECT' CAPTR	155-1071751
C135	SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR	950-1042951
C136	SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR	950-1042951
C137	1000UF 16V 5MM RAD ELEC' CAP (10X16)	155-1081750
C138	SMD 22NF 50V 10% CER X7R CAP 0805 (TRS)	950-2235621
C139	1UF16V 5MMRADIAL ELECT' CAPTR	155-1051751
C140	SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR	950-1042951
C141	SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR	950-1042951
C144	SMD 150PF 50V +-5% CER P2H CAP 0805 (TRS	955-1515501
C145	SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR	950-1042951
C146	SMD 390PF 50V 5% CER COG CAP 0805 (TRS)	950-3915501
C147	SMD 10NF 50V 10% CER X7R CAP 0805 (TRS)	950-1035621
C148	SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR	950-1042951
C150	SMD 1NF 50V 5% CER COG CAP 0805 (TRS)	950-1025501
C151	1UF16V 5MMRADIAL ELECT' CAPTR	155-1051751
C152	SMD 1NF 50V 5% CER COG CAP 0805 (TRS)	950-1025501
C153	1UF16V 5MMRADIAL ELECT' CAPTR	155-1051751
C154	SMD 1NF 50V 5% CER COG CAP 0805 (TRS)	950-1025501
C156	SMD 330PF 50V 10% CER COG CAP 0805 (TRS)	950-3315601
C157	SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR	950-2242951
C158	22UF 35V 5MM 20% MINI RAD ELEC' CAPTR	156-2263751
C159	SMD 470NF 16V 20/80 CER Y5V CAP 0805 TRS	950-4741951
C160	2.2UF 16V 5MMRADIAL ELECT' CAPTR	155-2251751
C161	47UF16V 5MMRADIAL ELECT' CAPTR	155-4761751
C162	3.3UF 16V 5MMRADIAL ELECT' CAPTR	155-3351751
C163	SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR	950-1042951

Service Manual

C164	2.2UF 16V 5MMRADIAL ELECT' CAPTR	155-2251751
C165	4.7UF 16V 5MMRADIAL ELECT' CAPTR	155-4751751
C166	47UF16V 5MMRADIAL ELECT' CAPTR	155-4761751
C167	SMD 3.3NF 50V 5% CER X7R CAP 0805 (TRS)	950-3325521
C168	4.7UF 16V 5MMRADIAL ELECT' CAPTR	155-4751751
C169	SMD 10NF 50V 10% CER X7R CAP 0805 (TRS)	950-1035621
C170	SMD 10NF 50V 10% CER X7R CAP 0805 (TRS)	950-1035621
C171	SMD 470PF 50V 10% CER X7R CAP 0805 (TRS)	50-4715621
C172	SMD 10NF 50V 10% CER X7R CAP 0805 (TRS)	950-1035621
C174	SMD 4.7NF 50V 10% CER X7R CAP 0805 (TRS)	950-4725621
C175	SMD 470NF 16V 20/80 CER Y5V CAP 0805 TRS	950-4741951
C176	2.2UF 16V 5MMRADIAL ELECT' CAPTR	155-2251751
C177	47UF16V 5MMRADIAL ELECT' CAPTR	155-4761751
C178	3.3UF 16V 5MMRADIAL ELECT' CAPTR	155-3351751
C179	SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR	950-1042951
C180	2.2UF 16V 5MMRADIAL ELECT' CAPTR	155-2251751
C181	4.7UF 16V 5MMRADIAL ELECT' CAPTR	155-4751751
C182	47UF16V 5MMRADIAL ELECT' CAPTR	155-4761751
C183	SMD 3.3NF 50V 5% CER X7R CAP 0805 (TRS)	950-3325521
C184	SMD 10NF 50V 10% CER X7R CAP 0805 (TRS)	950-1035621
C185	4.7UF 16V 5MMRADIAL ELECT' CAPTR	155-4751751
C186	SMD 10NF 50V 10% CER X7R CAP 0805 (TRS)	950-1035621
C187	SMD 470PF 50V 10% CER X7R CAP 0805 (TRS)	950-4715621
C188	SMD 10NF 50V 10% CER X7R CAP 0805 (TRS)	950-1035621
C190	SMD 4.7NF 50V 10% CER X7R CAP 0805 (TRS)	950-4725621
C192	SMD 10NF 50V 10% CER X7R CAP 0805 (TRS)	950-1035621
C193	100UF 16V 5MMRADIAL ELECT' CAPTR	155-1071751
C194	10UF25V 5MMRADIAL ELECT' CAPTR	155-1062751
C195	1000UF 16V 5MM RAD ELEC' CAP (10X16)	155-1081750
C196	100UF 16V 5MMRADIAL ELECT' CAPTR	155-1071751
C197	1000UF 16V 5MM RAD ELEC' CAP (10X16)	155-1081750
C198	10UF25V 5MMRADIAL ELECT' CAPTR	155-1062751
C199	10UF25V 5MMRADIAL ELECT' CAPTR	155-1062751
C200	10UF25V 5MMRADIAL ELECT' CAPTR	155-1062751
C201	10UF25V 5MMRADIAL ELECT' CAPTR	155-1062751
C202	1UF16V 5MMRADIAL ELECT' CAPTR	155-1051751
C203	SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR	950-1042951
C204		950-1015501
C205	SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR	950-2242951
C206	SMD 1N5 50V 10% CER X7R CAP 0805 (TRS)	950-1525621
C207	10UF25V 5MMRADIAL ELECT' CAPTR	155-1062751
C208	SMD 22NF 50V 10% CER X7R CAP 0805 (TRS)	950-2235621
C209	SMD 4.7NF 50V 10% CER X7R CAP 0805 (TRS)	950-4725621
C210	10UF25V 5MMRADIAL ELECT' CAPTR	155-1062751
C211	SMD 4.7NF 50V 10% CER X7R CAP 0805 (TRS)	950-4725621
C212	SMD 3.3NF 50V 5% CER X7R CAP 0805 (TRS)	950-3325521
C213	SMD 68NF 25V 10% CER X7R CAP 0805 (TRS)	950-6832621
C214	SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR	950-1042951
C215	10UF25V 5MMRADIAL ELECT' CAPTR	155-1062751
C216	SMD 3.3NF 50V 5% CER X7R CAP 0805 (TRS)	950-3325521
C219	SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR	950-1042951
C220	SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR	950-1042951
C221	220UF 16V 5MMRADIAL ELECT' CAPTR	155-2271751
C222	SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR	950-1042951
C225	SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR	950-1042951
C227	SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR	950-1042951
C228	SMD 1NF 50V 5% CER COG CAP 0805 (TRS)	950-1025501
C229	SMD 39PF 50V 5% CER COG CAP 0805 (TRS)	950-3905501
C230	SMD 100PF 50V 5% CER COG CAP 0805 (TRS)	950-1015501
C231	10UF25V 5MMRADIAL ELECT' CAPTR	155-1062751
C232	SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR	950-1042951
C233	10UF25V 5MMRADIAL ELECT' CAPTR	155-1062751
C235	SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR	950-1042951
C236	SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR	950-1042951
C238	SMD 470PF 50V 10% CER X7R CAP 0805 (TRS)	950-4715621
C239	SMD 100PF 50V 5% CER COG CAP 0805 (TRS)	950-1015501
C240	SMD 1NF 50V 5% CER COG CAP 0805 (TRS)	950-1025501
C241	SMD 47PF 50V 5% CER COG CAP 0805 (TRS)	950-4705501
C242	SMD 22PF 50V 5% CER COG CAP 0805 (TRS)	950-2205501
C243	SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR	950-1042951
C244	SMD 4.7PF 50V +-0.25PF CER COG CAP 0805	950-0475301
C245	SMD 47PF 50V 5% CER COG CAP 0805 (TRS)	950-4705501
C246	MD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR	950-1042951
C247	SMD 22PF 50V 5% CER COG CAP 0805 (TRS)	950-2205501
C248	SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR	950-1042951
C249	10UF25V 5MMRADIAL ELECT' CAPTR	155-1062751
C250	SMD 22PF 50V 5% CER COG CAP 0805 (TRS)	950-2205501
C251	SMD 22PF 50V 5% CER COG CAP 0805 (TRS)	950-2205501
C252	SMD 68NF 25V 10% CER X7R CAP 0805 (TRS)	950-6832621
C253	SMD 470PF 50V 10% CER X7R CAP 0805 (TRS)	950-4715621
C254	1UF16V 5MMRADIAL ELECT' CAPTR	155-1051751
C255	SMD 470PF 50V 10% CER X7R CAP 0805 (TRS)	950-4715621
C256	SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR	950-1042951
C257	1000UF 16V 5MM RAD ELEC' CAP (10X16)	155-1081750
C258	SMD 4.7PF 50V +-0.25PF CER COG CAP 0805	950-0475301
C259	SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR	950-2242951
C260	SMD 1.5PF 50V +-0.25PF CER COG CAP 0805	950-0155301
C261	SMD 220PF 50V 5% CER COG CAP 0805 (TRS)	950-2215501
C262	SMD 1NF 50V 5% CER COG CAP 0805 (TRS)	950-1025501
C263	SMD 100PF 50V 5% CER COG CAP 0805 (TRS)	950-1015501
C265	10UF25V 5MMRADIAL ELECT' CAPTR	155-1062751
C266	10UF25V 5MMRADIAL ELECT' CAPTR	155-1062751
C267	10UF25V 5MMRADIAL ELECT' CAPTR	155-1062751
C268	10UF25V 5MMRADIAL ELECT' CAPTR	155-1062751
C269	1000UF 16V 5MM RAD ELEC' CAP (10X16)	155-1081750
C270	10UF25V 5MMRADIAL ELECT' CAPTR	155-1062751
C271	10UF25V 5MMRADIAL ELECT' CAPTR	155-1062751
C272	10UF25V 5MMRADIAL ELECT' CAPTR	155-1062751
C273	10UF25V 5MMRADIAL ELECT' CAPTR	155-1062751
C274	10UF25V 5MMRADIAL ELECT' CAPTR	155-1062751
C276	10UF25V 5MMRADIAL ELECT' CAPTR	155-1062751
C277	100UF 16V 5MMRADIAL ELECT' CAPTR	155-1071751
C278	2200UF 16V 5.0MM RADIAL ELECT' CAP	155-2281770
C280	SMD 47PF 50V 5% CER COG CAP 0805 (TRS)	950-4705501
C286	SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR	950-1042951
C288	SMD 10NF 50V 10% CER X7R CAP 0805 (TRS)	950-1035621
C289	10UF25V 5MMRADIAL ELECT' CAPTR	155-1062751
C294	SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR	950-2242951
C300	SMD 47PF 50V 5% CER COG CAP 0805 (TRS)	950-4705501
C301		950-1042951
C305	SMD 150PF 50V 5% CER COG CAP 0805 (TRS)	950-1515501
C306	SMD 150PF 50V 5% CER COG CAP 0805 (TRS)	950-1515501
C307	10UF25V 5MMRADIAL ELECT' CAPTR	155-1062751
C309	10UF25V 5MMRADIAL ELECT' CAPTR	155-1062751
C313	SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR	950-2242951
C318	10UF25V 5MMRADIAL ELECT' CAPTR	155-1062751
C319	SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR	950-1042951
C320	SMD 22PF 50V 5% CER COG CAP 0805 (TRS)	950-2205501
C321	SMD 330PF 50V 10% CER COG CAP 0805 (TRS)	950-3315601
C322	SMD 22PF 50V 5% CER COG CAP 0805 (TRS)	950-2205501
C324	10UF25V 5MMRADIAL ELECT' CAPTR	155-1062751
C325	SMD 22PF 50V 5% CER COG CAP 0805 (TRS)	950-2205501
C326	SMD 27PF 50V 5% CER COG CAP 0805 (TRS)	950-2705501
C327	SMD 5.6PF 50V +-0.25PF CER COG CAP 0805	950-0565301
C330	SMD 12PF 50V 5% CER COG CAP 0805 (TRS)	950-1205501
C332	SMD 12PF 50V 5% CER COG CAP 0805 (TRS)	950-1205501
C334	SMD 1NF 50V 5% CER COG CAP 0805 (TRS)	950-1025501
C335	SMD 1NF 50V 5% CER COG CAP 0805 (TRS)	950-1025501
C336	SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR	950-1042951
C337	4.7UF 35V 5MMRADIAL ELECT' CAP TR	155-4753751
C339	SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR	950-2242951
C340	SMD 47PF 50V 5% CER COG CAP 0805 (TRS)	950-4705501
C342	SMD 470PF 50V 10% CER X7R CAP 0805 (TRS)	950-4715621
C539	SMD 1.5PF 50V +-0.25PF CER COG CAP 0805	950-0155301

C540	1UF 50V 5MM 20% MINI RAD ELEC' CAPTR	156-1055751
C541	10UF25V 5MMRADIAL ELECT' CAPTR	155-1062751
C542	22UF 35V 5MM 20% MINI RAD ELEC' CAPTR	156-2263751
C544	10UF25V 5MMRADIAL ELECT' CAPTR	155-1062751
C545	SMD 470NF 16V 20/80 CER Y5V CAP 0805 TRS	950-4741951
C546	SMD 470NF 16V 20/80 CER Y5V CAP 0805 TRS	950-4741951
C549	SMD 220PF 50V 5% CER COG CAP 0805 (TRS)	950-2215501
C550	SMD 330PF 50V 10% CER COG CAP 0805 (TRS)	950-3315601
C551	SMD 2.2NF 50V 5% CER COG CAP 0805 (TRS)	950-2225501
C552	SMD 2.2NF 50V 5% CER COG CAP 0805 (TRS)	950-2225501
C553	SMD 100PF 50V 5% CER COG CAP 0805 (TRS)	950-1015501
C554	SMD 220PF 50V 5% CER COG CAP 0805 (TRS)	950-2215501
C555	10UF25V 5MMRADIAL ELECT' CAPTR	155-1062751
C556	SMD 2K70.1W5% RES 0805 (TRS)	940-2720501
C557	SMD 270PF 50V5% CER.CAP 0805 (TRS)	950-2715501
C559	SMD 270PF 50V5% CER.CAP 0805 (TRS)	950-2715501
C561	SMD 0.1W5% ZEROHM LINK-0805 (TRS)	940-0000501
C562	10UF25V 5MMRADIAL ELECT' CAPTR	155-1062751
C563	SMD 1NF 50V 5% CER COG CAP 0805 (TRS)	950-1025501
C565	SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR	950-2242951
C566	SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR	950-2242951
C567	SMD 330PF 50V 10% CER COG CAP 0805 (TRS)	950-3315601

Diodes

D1	DIODE-1N4007TR	120-0400701
D2	DIODE-1N4007TR	120-0400701
D3	DIODE-1N4007TR	120-0400701
D4	DIODE-1N4007TR	120-0400701
D5	DIODE-BYV96D (PHILIPS)TR	120-0009611
D6	DIODE-BYV96D (PHILIPS)TR	120-0009611
D8	SIGNAL DIODE-1N4148 75MA 75VTR	120-0414801
D9	SIGNAL DIODE-1N4148 75MA 75VTR	120-0414801
D10	SIGNAL DIODE-1N4148 75MA 75VTR	120-0414801
D11	3V9 5% 400MW ZENER DIODETR	125-0039501
D12	DIODE-BYV95A (PHILIPS)TR	120-0009511
D13	DIODE-BYW98-50TR	120-0009801
D14	DIODE-BYW98-50TR	120-0009801
D15	DIODE-BYV95A (PHILIPS)TR	120-0009511
D16	DIODE-1N4007TR	120-0400701
D17	DIODE-1N4007TR	120-0400701
D20	MD DIODE-BAS16 SOT-23	912-0001651
D21	SMD DIODE-BB515 MINI PLAST (TRS)	912-0051501
D22	SMD DIODE-BAS19 SOT-23 (TRS)	912-0001951
D38	SIGNAL DIODE-BAT43TR	120-0004301
D39	SMD DIODE-BB619 MINI PLAST (TRS)	912-0061901
D40	5V6 5% 400MW ZENER DIODE TR	125-0056501
D41	4V7 2% 400MW ZENER DIODETR	125-0047201
D42	4V7 2% 400MW ZENER DIODETR	125-0047201
D43	4V3 2% 400MW ZENER DIODE TR	125-0043201
D44	2V4 2% 400MW ZENER DIODE TR	125-0024201
D49	SMD DIODE-BAS16 SOT-23	912-0001651
D50	SMD DIODE-BAS16 SOT-23	912-0001651
D51	SMD DIODE-BAS16 SOT-23	912-0001651
D52	5V6 5% 400MW ZENER DIODE TR	125-0056501
D53	5V6 5% 400MW ZENER DIODE TR	125-0056501
D54	5V6 5% 400MW ZENER DIODE TR	125-0056501
D55	5V6 5% 400MW ZENER DIODE TR	125-0056501
D56	SMD DIODE-BAS16 SOT-23	912-0001651
D57	SMD DIODE-BAS16 SOT-23	912-0001651
D58	SMD DIODE-BAS16 SOT-23	912-0001651
D59	6V8 2% 200MW ZENER DIODE TR	125-0068201
D60	SMD DIODE-BAS16 SOT-23	912-0001651
D61	SMD DIODE-BAS16 SOT-23	912-0001651
D62	SIGNAL DIODE-BAT43TR	120-0004301
D63	5V6 2% 400MW ZENER DIODE TR	125-0056201
D64	SMD DIODE-BAS16 SOT-23	912-0001651
D65	SMD DIODE-BAS16 SOT-23	912-0001651
D66	SIGNAL DIODE-BAT43TR	120-0004301
D67	4V7 2% 400MW ZENER DIODETR	125-0047201
D69	5V6 5% 400MW ZENER DIODE TR	125-0056501
D70	SIGNAL DIODE-BAT43TR	120-0004301
D76	5V6 5% 400MW ZENER DIODE TR	125-0056501
D77	5V1 2% 400MW ZENER DIODE TR	125-0051201
D78	5V1 2% 400MW ZENER DIODE TR	125-0051201
D79	SMD DIODE-BB619 MINI PLAST (TRS)	912-0061901
D96	SMD DIODE-BAS16 SOT-23	912-0001651
D97	SMD DIODE-BAS16 SOT-23	912-0001651
D98	4V7 2% 400MW ZENER DIODETR	125-0047201
D100	SMD DIODE-BAS16 SOT-23	912-0001651

Inductors

L1	INDUCTOR-1A 100UH (TDK TSL1110-101K1RO)	131-1000500
L2	INDUCTOR-1A 100UH (TDK TSL1110-101K1RO)	131-1000500
L3	AXIAL INDUCTOR-18UH 10% DC RES <0.8R TR	130-0180611
L4	BALUN-BC0403RID-B (PEDOKA)	133-0040300
L5	200NH-COIL(GOLD) AIR WOUND (PEDOKA)	134-0200080
L6	200NH-COIL(GOLD) AIR WOUND (PEDOKA)	134-0200080
L7	SOUND COIL 4.77UH +-3% TOKO	133-0047050
L8	18NH-COIL (GOLD) AIR WOUND (PEDOKA)	134-0018080
L10	AXIAL INDUCTOR-18UH 5% 0.5MMTR	130-0180501
L11	AXIAL INDUCTOR-18UH 5% 0.5MMTR	130-0180501
L12	15UH 5% AXIAL INDUCTORTR	130-0150501
L14	2U2H 5% AXIAL INDUCTORTR	130-0022501
L15	ADJ COIL 119LNS-4713HM (TOKO)	133-1194713
L16	ADJ COIL 119LNS-4713HM (TOKO)	133-1194713
L19	RAD FERR BEAD(PEDOKA BL02RN2-R62T2) TR	133-0226201
L20	AXIAL INDUCTOR-18UH 10% DC RES <0.8R TR	130-0180611
L21	15UH 5% AXIAL INDUCTORTR	130-0150501
L22	AXIAL IND -12UH 5% SRF 19MHZ MINTR	130-0120501
L23	AXIAL INDUCTOR-18UH 10% DC RES <0.8R TR	130-0180611
L24	AXIAL INDUCTOR-18UH 10% DC RES <0.8R TR	130-0180611
L25	AXIAL INDUCTOR-1UH5% TR	130-0010501
L26	AXIAL INDUCTOR-18UH 10% DC RES <0.8R TR	130-0180611
L28	AXIAL INDUCTOR-33UH 5% TR	130-0330501
L29	AXIAL INDUCTOR-150UH 10% DC RES<2.8R TR	130-1500611
L30	2U2H 5% AXIAL INDUCTORTR	130-0022501
L31	AXIAL INDUCTOR-18UH 10% DC RES <0.8R TR	130-0180611
L50	18NH-COIL (GOLD) AIR WOUND (PEDOKA)	134-0018080
L51	15NH-COIL(GREEN) AIR WOUND (PEDOKA)	134-0015090
L52	TINNED COPPER WIRE LINK	999-1099901
L53	100R 0.25W 5% CAR FILM RES TR	140-1012501
L54	RAD FERR BEAD(PEDOKA BL02RN2-R62T2) TR	133-0226201
L55	2U2H 5% AXIAL INDUCTORTR	130-0022501

Transistors

Q1	TRANSISTOR-BUT11A (PHILIPS)	110-0001101
Q2	TRANSISTOR-FTX749 (ZETEX)TR	110-0074911
Q3	TRANSISTOR-FTX749 (ZETEX)TR	110-0074911
Q4	TRANSISTOR-FTX749 (ZETEX)TR	110-0074911
Q5	TRANSISTOR-FTX749 (ZETEX)TR	110-0074911
Q6	TRANSISTOR-FTX749 (ZETEX)TR	110-0074911
Q7	SMD TRANSISTOR-BC846B SOT-23	911-1084651
Q8	SMD TRANSISTOR-BC856B SOT-23	911-1085651
Q9	SMD TRANSISTOR-BC846B SOT-23	911-1084651
Q10	SMD TRANSISTOR-BFR193 (SIEMENS) SOT-23	911-0019351
Q11	SMD TRANSISTOR-BFR193 (SIEMENS) SOT-23	911-0019351
Q15	SMD TRANSISTOR-ZVN3306F SOT-23	911-0330651
Q18	SMD TRANSISTOR-BC846B SOT-23	911-1084651
Q19	SMD TRANSISTOR-BC856B SOT-23	911-1085651
Q20	SMD TRANSISTOR-BC856B SOT-23	911-1085651
Q22	SMD TRANSISTOR-BC846B SOT-23	911-1084651
Q23	SMD TRANSISTOR-BC846B SOT-23	911-1084651
Q24	SMD TRANSISTOR-BC856B SOT-23	911-1085651
Q25	TRANSISTOR-ZTX314 TO-92 PACK.(ZETEX) TR	110-0031411
Q26	SMD TRANSISTOR-BC846B SOT-23	911-1084651

Q27	SMD TRANSISTOR-BC846B SOT-23	911-1084651
Q30	SMD TRANSISTOR-BC846B SOT-23	911-1084651
Q31	SMD TRANSISTOR-BC846B SOT-23	911-1084651
Q32	SMD TRANSISTOR-BC846B SOT-23	911-1084651
Q33	SMD TRANSISTOR-FMMT2369A SOT-23	911-0236951
Q34	SMD TRANSISTOR-BC846B SOT-23	911-1084651
Q35	SMD TRANSISTOR-BC856B SOT-23	911-1085651
Q36	SMD TRANSISTOR-BC856B SOT-23	911-1085651
Q37	SMD TRANSISTOR-BC856B SOT-23	911-1085651
Q38	SMD TRANSISTOR-BC846B SOT-23	911-1084651
Q39	SMD TRANSISTOR-BC846B SOT-23	911-1084651
Q40	SMD TRANSISTOR-BC856B SOT-23	911-1085651
Q41	SMD TRANSISTOR-BC846B SOT-23	911-1084651
Q42	PWR TRANSISTOR-BD139 NPN TO-126 PAC.TR	110-0013901
Q43	PWR TRANSISTOR-BD139 NPN TO-126 PAC.TR	110-0013901
Q44	SMD TRANSISTOR-BC856B SOT-23	911-1085651
Q45	SMD TRANSISTOR-BC846B SOT-23	911-1084651
Q66	SMD TRANSISTOR-BC846B SOT-23	911-1084651
Q89	SMD TRANSISTOR-BC856B SOT-23	911-1085651
Q90	SMD TRANSISTOR-BC846B SOT-23	911-1084651
Q91	SMD TRANSISTOR-BC846B SOT-23	911-1084651
Q92	TRANSISTOR-ZVN3306A FET	110-0330601
Q93	SMD TRANSISTOR-BC846B SOT-23	911-1084651
Q96	SMD TRANSISTOR-BC846B SOT-23	911-1084651
Q97	SMD TRANSISTOR-BC846B SOT-23	911-1084651
Q98	SMD TRANSISTOR-BC846B SOT-23	911-1084651
Q99	SMD TRANSISTOR-BC856B SOT-23	911-1085651
Q100	SMD TRANSISTOR-FMMT2369A SOT-23	911-0236951
Q102	SMD TRANSISTOR-BC856B SOT-23	911-1085651
Q103	TRANSISTOR-ZTX314 TO-92 PACK.(ZETEX) TR	110-0031411
Q104	SMD TRANSISTOR-FMMT2369A SOT-23	911-0236951
Q105	SMD TRANSISTOR-BC846B SOT-23	911-1084651
Q106	SMD TRANSISTOR-FMMT2369A SOT-23	911-0236951
Q108	SMD TRANSISTOR-BC846B SOT-23	911-1084651
Q109	SMD TRANSISTOR-FMMT2369A SOT-23	911-0236951
Q110	TRANSISTOR-BC547B NPN TO-92 PACKAGE TR	110-1054701
Q111	SMD TRANSISTOR-BC846B SOT-23	911-1084651

Resistors

R1	4R7 3W 5% AXIAL W/W RES WA84 TYPE	143-0476511
R2	100K 2W5% METAL FILM RES TR	142-1046511
R4	2K2 2W5% METAL FILM RES TR	142-2226511
R5	1K 5W 10% AX/PLUG CER CASE RES KWP332	145-1029600
R6	15R0.25W 5% CARBON FILM RESTR	140-1502501
R7	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R8	*A* 0R75 0.5W 5% NON-FLAMMABLE RESTR	148-0075551
R9	SMD 22K0.1W5% RES 0805 (TRS)	940-2230501
R10	SMD 1K0.1W1% RES 0805 (TRS)	940-1020101
R11	SMD 2K0.1W1% RES 0805 (TRS)	940-2020101
R12	SMD 22K0.1W5% RES 0805 (TRS)	940-2230501
R13	SMD 47K0.1W5% RES 0805 (TRS)	940-4730501
R14	*A* 100R 0.25W 5% NON-FLAMMABLE RESTR	148-1012551
R15	68R0.25W 5% CARBON FILM RESTR	140-6802501
R16	68R0.25W 5% CARBON FILM RESTR	140-6802501
R17	4R70.25W 5% CARBON FILM RESTR	140-0472501
R18	470R 0.25W 1% METAL FILM RES	141-4712101
R19	*A* 4M7 0.5W VR37 METAL FILM RESTR	142-4755511
R21	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R22	SMD 560R 0.1W5% RES 0805 (TRS)	940-5610501
R23	SMD 560R 0.1W5% RES 0805 (TRS)	940-5610501
R25	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R26	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R27	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R28	SMD 270R 0.1W5% RES 0805 (TRS)	940-2710501
R29	SMD 270R 0.1W5% RES 0805 (TRS)	940-2710501
R30	SMD 680R 0.1W5% RES 0805 (TRS)	940-6810501
R31	SMD 680R 0.1W5% RES 0805 (TRS)	940-6810501
R34	SMD 680R 0.1W5% RES 0805 (TRS)	940-6810501
R35	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R36	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R37	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R38	SMD 75R0.1W5% RES 0805 (TRS)	940-7500501
R39	SMD 75R0.1W5% RES 0805 (TRS)	940-7500501
R40	SMD 75R0.1W5% RES 0805 (TRS)	940-7500501
R41	SMD 75R0.1W5% RES 0805 (TRS)	940-7500501
R42	SMD 75R0.1W5% RES 0805 (TRS)	940-7500501
R43	SMD 75R0.1W5% RES 0805 (TRS)	940-7500501
R44	SMD 75R0.1W5% RES 0805 (TRS)	940-7500501
R45	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R46	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R47	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R48	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R49	SMD 6K80.1W5% RES 0805 (TRS)	940-6820501
R50	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R51	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R52	SMD 47K0.1W5% RES 0805 (TRS)	940-4730501
R82	SMD 1K20.1W5% RES 0805 (TRS)	940-1220501
R84	SMD 12R0.1W5% RES 0805 (TRS)	940-1200501
R85	SMD 150R 0.1W5% RES 0805 (TRS)	940-1510501
R86	SMD 560R 0.1W5% RES 0805 (TRS)	940-5610501
R87	SMD 2K0.1W1% RES 0805 (TRS)	940-2020101
R88	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R89	SMD 2K0.1W1% RES 0805 (TRS)	940-2020101
R91	SMD 470R 0.1W5% RES 0805 (TRS)	940-4710501
R92	SMD 22R0.1W5% RES 0805 (TRS)	940-2200501
R93	SMD 22R0.1W5% RES 0805 (TRS)	940-2200501
R94	SMD 120R 0.1W5% RES 0805 (TRS)	940-1210501
R95	SMD 330R 0.1W5% RES 0805 (TRS)	940-3310501
R96	SMD 75R0.1W5% RES 0805 (TRS)	940-7500501
R98	SMD 8K20.1W5% RES 0805 (TRS)	940-8220501
R103	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R104	SMD 22K0.1W5% RES 0805 (TRS)	940-2230501
R109	SMD 22K0.1W5% RES 0805 (TRS)	940-2230501
R113	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R128	SMD 100K 0.1W5% RES 0805 (TRS)	940-1040501
R129	SMD 220R 0.1W5% RES 0805 (TRS)	940-2210501
R130	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R131	SMD 5K60.1W1% RES 0805 (TRS)	940-5620101
R132	SMD 2K20.1W5% RES 0805 (TRS)	940-2220501
R133	SMD 100K 0.1W5% RES 0805 (TRS)	940-1040501
R134	SMD 1K0.1W1% RES 0805 (TRS)	940-1020101
R135	SMD 3K9 0.1W 1% RES 0805 (TRS)	940-3920101
R142	SMD 360R 0.1W5% RES 0805 (TRS)	940-3610501
R143	SMD 360R 0.1W5% RES 0805 (TRS)	940-3610501
R144	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R145	SMD 1K0.1W1% RES 0805 (TRS)	940-1020101
R148	SMD 470R 0.1W5% RES 0805 (TRS)	940-4710501
R149	SMD 270R 0.1W5% RES 0805 (TRS)	940-2710501
R150	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R151	SMD 4K70.1W1% RES 0805 (TRS)	940-4720101
R152	SMD 910R 0.1W1% RES 0805 (TRS)	940-9110101
R153	SMD 3K30.1W1% RES 0805 (TRS)	940-3320101
R154	SMD 1K0.1W1% RES 0805 (TRS)	940-1020101
R155	SMD 3K60.1W1% RES 0805 (TRS)	940-3620101
R156	SMD 910R 0.1W1% RES 0805 (TRS)	940-9110101
R157	SMD 2K20.1W5% RES 0805 (TRS)	940-2220501
R158	SMD 3K60.1W1% RES 0805 (TRS)	940-3620101
R159	SMD 1K0.1W5% RES 0805 (TRS)	940-1020501
R160	SMD 910R 0.1W1% RES 0805 (TRS)	940-9110101
R161	SMD 8K20.1W5% RES 0805 (TRS)	940-8220501
R163	SMD 1K20.1W5% RES 0805 (TRS)	940-1220501
R164	SMD 3K9 0.1W 1% RES 0805 (TRS)	940-3920101
R165	SMD 1K5 0.1W1% RES 0805 (TRS)	940-1520101
R166	SMD 150R 0.1W5% RES 0805 (TRS)	940-1510501

R167	SMD 150R 0.1W5% RES 0805 (TRS)	940-1510501
R168	SMD 120R 0.1W5% RES 0805 (TRS)	940-1210501
R169	SMD 1K0.1W5% RES 0805 (TRS)	940-1020501
R170	SMD 470R 0.1W5% RES 0805 (TRS)	940-4710501
R171	SMD 680R 0.1W1% RES 0805 (TRS)	940-6810101
R172	SMD 75R0.1W5% RES 0805 (TRS)	940-7500501
R173	SMD 1K0.1W5% RES 0805 (TRS)	940-1020501
R174	SMD 1K20.1W5% RES 0805 (TRS)	940-1220501
R175	SMD 100R 0.1W5% RES 0805 (TRS)	940-1010501
R176	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R177	SMD 360R 0.1W5% RES 0805 (TRS)	940-3610501
R178	SMD 560R 0.1W5% RES 0805 (TRS)	940-5610501
R179	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R180	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R181	SMD 1K0.1W5% RES 0805 (TRS)	940-1020501
R182	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R184	SMD 680R 0.1W5% RES 0805 (TRS)	940-6810501
R185	SMD 0.1W5% ZEROHM LINK-0805 (TRS)	940-0000501
R186	SMD 0.1W5% ZEROHM LINK-0805 (TRS)	940-0000501
R187	SMD 47K0.1W5% RES 0805 (TRS)	940-4730501
R188	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R189	SMD 15K0.1W5% RES 0805 (TRS)	940-1530501
R190	SMD 470R 0.1W5% RES 0805 (TRS)	940-4710501
R191	SMD 1K0.1W5% RES 0805 (TRS)	940-1020501
R192	SMD 470R 0.1W5% RES 0805 (TRS)	940-4710501
R193	SMD 1K0.1W5% RES 0805 (TRS)	940-1020501
R195	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R197	SMD 68K0.1W5% RES 0805 (TRS)	940-6830501
R198	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R199	SMD 2K20.1W5% RES 0805 (TRS)	940-2220501
R200	SMD 10M0.1W 10% RES 0805 (TRS)	940-1060601
R201	SMD 4M70.1W 10% RES 0805 (TRS)	940-4750601
R202	SMD 82K0.1W5% RES 0805 (TRS)	940-8230501
R203	SMD 39K0.1W5% RES 0805 (TRS)	940-3930501
R204	SMD 1K0.1W5% RES 0805 (TRS)	940-1020501
R205	SMD 47K0.1W5% RES 0805 (TRS)	940-4730501
R206	SMD 39K0.1W5% RES 0805 (TRS)	940-3930501
R207	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R208	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R209	SMD 4M70.1W 10% RES 0805 (TRS)	940-4750601
R210	SMD 220K 0.1W5% RES 0805 (TRS)	940-2240501
R211	SMD 220K 0.1W5% RES 0805 (TRS)	940-2240501
R212	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R213	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R214	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R215	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R216	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R217	SMD 100K 0.1W5% RES 0805 (TRS)	940-1040501
R218	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R219	SMD 33K0.1W5% RES 0805 (TRS)	940-3330501
R220	SMD 3K30.1W1% RES 0805 (TRS)	940-3320101
R221	SMD 6K80.1W5% RES 0805 (TRS)	940-6820501
R222	SMD 1K20.1W5% RES 0805 (TRS)	940-1220501
R223	SMD 3K9 0.1W 1% RES 0805 (TRS)	940-3920101
R226	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R227	SMD 68K0.1W5% RES 0805 (TRS)	940-6830501
R228	SMD 2K20.1W5% RES 0805 (TRS)	940-2220501
R229	SMD 10M0.1W 10% RES 0805 (TRS)	940-1060601
R230	SMD 4M70.1W 10% RES 0805 (TRS)	940-4750601
R231	SMD 82K0.1W5% RES 0805 (TRS)	940-8230501
R232	SMD 39K0.1W5% RES 0805 (TRS)	940-3930501
R233	SMD 1K0.1W5% RES 0805 (TRS)	940-1020501
R234	SMD 47K0.1W5% RES 0805 (TRS)	940-4730501
R235	SMD 39K0.1W5% RES 0805 (TRS)	940-3930501
R236	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R237	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R238	SMD 4M70.1W 10% RES 0805 (TRS)	940-4750601
R239	SMD 220K 0.1W5% RES 0805 (TRS)	940-2240501
R240	SMD 220K 0.1W5% RES 0805 (TRS)	940-2240501
R241	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R242	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R243	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R244	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R245	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R246	SMD 100K 0.1W5% RES 0805 (TRS)	940-1040501
R247	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R248	SMD 33K0.1W5% RES 0805 (TRS)	940-3330501
R249	SMD 3K30.1W1% RES 0805 (TRS)	940-3320101
R250	SMD 6K80.1W5% RES 0805 (TRS)	940-6820501
R251	SMD 1K20.1W5% RES 0805 (TRS)	940-1220501
R252	SMD 3K9 0.1W 1% RES 0805 (TRS)	940-3920101
R254	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R255	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R256	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R257	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R258	SMD 33K0.1W5% RES 0805 (TRS)	940-3330501
R259	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R261	SMD 100R 0.1W5% RES 0805 (TRS)	940-1010501
R262	SMD 75R0.1W5% RES 0805 (TRS)	940-7500501
R263	SMD 39K0.1W5% RES 0805 (TRS)	940-3930501
R264	SMD 220R 0.1W5% RES 0805 (TRS)	940-2210501
R265	SMD 22K0.1W5% RES 0805 (TRS)	940-2230501
R266	SMD 100R 0.1W5% RES 0805 (TRS)	940-1010501
R267	SMD 75R0.1W5% RES 0805 (TRS)	940-7500501
R268	SMD 75R0.1W5% RES 0805 (TRS)	940-7500501
R269	SMD 1K0.1W5% RES 0805 (TRS)	940-1020501
R271	SMD 560R 0.1W5% RES 0805 (TRS)	940-5610501
R272	SMD 560R 0.1W5% RES 0805 (TRS)	940-5610501
R273	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R274	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R275	SMD 220K 0.1W5% RES 0805 (TRS)	940-2240501
R276	SMD 220K 0.1W5% RES 0805 (TRS)	940-2240501
R277	SMD 220K 0.1W5% RES 0805 (TRS)	940-2240501
R278	SMD 220K 0.1W5% RES 0805 (TRS)	940-2240501
R280	SMD 560R 0.1W5% RES 0805 (TRS)	940-5610501
R281	SMD 22K0.1W5% RES 0805 (TRS)	940-2230501
R282	SMD 22K0.1W5% RES 0805 (TRS)	940-2230501
R283	SMD 560R 0.1W5% RES 0805 (TRS)	940-5610501
R285	SMD 2K20.1W5% RES 0805 (TRS)	940-2220501
R286	SMD 2K20.1W5% RES 0805 (TRS)	940-2220501
R287	SMD 560R 0.1W5% RES 0805 (TRS)	940-5610501
R288	SMD 560R 0.1W5% RES 0805 (TRS)	940-5610501
R294	SMD 100R 0.1W5% RES 0805 (TRS)	940-1010501
R296	SMD 270R 0.1W5% RES 0805 (TRS)	940-2710501
R298	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R299	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R300	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R301	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R303	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R304	SMD 470K 0.1W5% RES 0805 (TRS)	940-4740501
R305	SMD 100K 0.1W5% RES 0805 (TRS)	940-1040501
R306	SMD 470R 0.1W5% RES 0805 (TRS)	940-4710501
R307	SMD 1K0.1W5% RES 0805 (TRS)	940-1020501
R308	SMD 2K70.1W5% RES 0805 (TRS)	940-2720501
R309	SMD 2K70.1W5% RES 0805 (TRS)	940-2720501
R310	SMD 2K70.1W5% RES 0805 (TRS)	940-2720501
R311	SMD 100K 0.1W5% RES 0805 (TRS)	940-1040501
R312	SMD 3K30.1W1% RES 0805 (TRS)	940-3320101
R314	SMD 15K0.1W5% RES 0805 (TRS)	940-1530501
R315	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R316	SMD 220R 0.1W5% RES 0805 (TRS)	940-2210501
R317	SMD 100R 0.1W5% RES 0805 (TRS)	940-1010501
R318	SMD 470R 0.1W5% RES 0805 (TRS)	940-4710501
R320	SMD 330R 0.1W5% RES 0805 (TRS)	940-3310501

R321	SMD 1K0.1W5% RES 0805 (TRS)	940-1020501
R323	SMD 910R 0.1W1% RES 0805 (TRS)	940-9110101
R324	SMD 2K20.1W5% RES 0805 (TRS)	940-2220501
R325	SMD 1K0.1W5% RES 0805 (TRS)	940-1020501
R326	SMD 1K0.1W5% RES 0805 (TRS)	940-1020501
R327	SMD 75R0.1W5% RES 0805 (TRS)	940-7500501
R328	SMD 470R 0.1W5% RES 0805 (TRS)	940-4710501
R329	SMD 680R 0.1W1% RES 0805 (TRS)	940-6810101
R330	SMD 330R 0.1W5% RES 0805 (TRS)	940-3310501
R331	SMD 1K5 0.1W1% RES 0805 (TRS)	940-1520101
R333	SMD 1M0.1W5% RES 0805 (TRS)	940-1050501
R334	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R335	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R336	SMD 1K20.1W5% RES 0805 (TRS)	940-1220501
R337	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R338	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R339	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R340	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R341	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R342	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R343	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R345	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R346	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R347	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R348	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R349	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R350	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R351	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R352	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R353	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R354	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R355	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R356	SMD 100R 0.1W5% RES 0805 (TRS)	940-1010501
R357	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R358	SMD 15K0.1W5% RES 0805 (TRS)	940-1530501
R359	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R360	SMD 100R 0.1W 5% RES	940-1010501
R361	SMD 100R 0.1W5% RES 0805 (TRS)	940-1010501
R362	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R363	SMD 12R0.1W5% RES 0805 (TRS)	940-1200501
R364	SMD 1K5 0.1W1% RES 0805 (TRS)	940-1520101
R365	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R366	SMD 1K5 0.1W1% RES 0805 (TRS)	940-1520101
R367	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R368	SMD 12R0.1W5% RES 0805 (TRS)	940-1200501
R369	SMD 12R0.1W5% RES 0805 (TRS)	940-1200501
R370	SMD 12R0.1W5% RES 0805 (TRS)	940-1200501
R371	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R372	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R373	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R374	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R375	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R376	SMD 130R 0.1W1% RES 0805 (TRS)	940-1310101
R377	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R378	SMD 2K0.1W1% RES 0805 (TRS)	940-2020101
R379	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R380	SMD 1K10.1W1% RES 0805 (TRS)	940-1120101
R381	SMD 7K32 0.1W1% RES 0805 (TRS)	940-7320191
R382	SMD 470R 0.1W5% RES 0805 (TRS)	940-4710501
R383	SMD 2K0.1W1% RES 0805 (TRS)	940-2020101
R385	SMD 120R 0.1W5% RES 0805 (TRS)	940-1210501
R386	SMD 2K0.1W1% RES 0805 (TRS)	940-2020101
R387	SMD 4K70.1W1% RES 0805 (TRS)	940-4720101
R388	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R389	SMD 5R60.1W5% RES 0805 (TRS)	940-0560501
R390	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R391	SMD 15K0.1W5% RES 0805 (TRS)	940-1530501
R392	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R393	SMD 15K0.1W5% RES 0805 (TRS)	940-1530501
R394	SMD 3R9 0.1W5% RES 0805 (TRS)	940-0390501
R395	SMD 270R 0.1W5% RES 0805 (TRS)	940-2710501
R396	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R397	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R398	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R399	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R400	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R404	SMD 220R 0.1W5% RES 0805 (TRS)	940-2210501
R405	SMD 12R0.1W5% RES 0805 (TRS)	940-1200501
R406	SMD 0.1W5% ZEROHM LINK-0805 (TRS)	940-0000501
R407	470R 0.25W 1% METAL FILM RES	141-4712101
R412	SMD 680R 0.1W5% RES 0805 (TRS)	940-6810501
R413	SMD 560R 0.1W5% RES 0805 (TRS)	940-5610501
R414	SMD 560R 0.1W5% RES 0805 (TRS)	940-5610501
R415	SMD 75R0.1W5% RES 0805 (TRS)	940-7500501
R416	SMD 220R 0.1W5% RES 0805 (TRS)	940-2210501
R417	SMD 100R 0.1W5% RES 0805 (TRS)	940-1010501
R418	SMD 0.1W5% ZEROHM LINK-0805 (TRS)	940-0000501
R419	SMD 470R 0.1W5% RES 0805 (TRS)	940-4710501
R420	SMD 100R 0.1W5% RES 0805 (TRS)	940-1010501
R421	SMD 2K20.1W5% RES 0805 (TRS)	940-2220501
R422	SMD 47K0.1W5% RES 0805 (TRS)	940-4730501
R423	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R424	SMD 2K20.1W5% RES 0805 (TRS)	940-2220501
R426	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R427	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R428	SMD 100R 0.1W5% RES 0805 (TRS)	940-1010501
R429	SMD 560R 0.1W5% RES 0805 (TRS)	940-5610501
R430	SMD 560R 0.1W5% RES 0805 (TRS)	940-5610501
R431	SMD 75R0.1W5% RES 0805 (TRS)	940-7500501
R435	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R436	SMD 1K20.1W5% RES 0805 (TRS)	940-1220501
R437	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R438	SMD 1K20.1W5% RES 0805 (TRS)	940-1220501
R440	SMD 220R 0.1W5% RES 0805 (TRS)	940-2210501
R441	SMD 1K0.1W5% RES 0805 (TRS)	940-1020501
R444	SMD 2K20.1W5% RES 0805 (TRS)	940-2220501
R449	SMD 100K 0.1W5% RES 0805 (TRS)	940-1040501
R450	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R451	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R452	SMD 2K20.1W5% RES 0805 (TRS)	940-2220501
R454	SMD 0.1W5% ZEROHM LINK-0805 (TRS)	940-0000501
R456	SMD 0.1W5% ZEROHM LINK-0805 (TRS)	940-0000501
R458	SMD 0.1W5% ZEROHM LINK-0805 (TRS)	940-0000501
R459	SMD 0.1W5% ZEROHM LINK-0805 (TRS)	940-0000501
R464	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R465	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R467	SMD 270R 0.1W5% RES 0805 (TRS)	940-2710501
R468	SMD 270R 0.1W5% RES 0805 (TRS)	940-2710501
R469	SMD 33R0.1W5% RES 0805 (TRS)	940-3300501
R471	SMD 0.1W5% ZEROHM LINK-0805 (TRS)	940-0000501
R472	SMD 12R0.1W5% RES 0805 (TRS)	940-1200501
R473	SMD 22R0.1W5% RES 0805 (TRS)	940-2200501
R475	SMD 100K 0.1W5% RES 0805 (TRS)	940-1040501
R492	SMD 220K 0.1W5% RES 0805 (TRS)	940-2240501
R493	SMD 220K 0.1W5% RES 0805 (TRS)	940-2240501
R494	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R495	SMD 0.1W5% ZEROHM LINK-0805 (TRS)	940-0000501
R497	SMD 47R0.1W5% RES 0805 (TRS)	940-4700501
R499	SMD 0.1W5% ZEROHM LINK-0805 (TRS)	940-0000501
R500	SMD 2K70.1W5% RES 0805 (TRS)	940-2720501
R501	SMD 5K60.1W1% RES 0805 (TRS)	940-5620101
R502	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R503	SMD 1K0.1W5% RES 0805 (TRS)	940-1020501
R504	SMD 1K20.1W5% RES 0805 (TRS)	940-1220501

R505	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R509	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R512	SMD 270R 0.1W5% RES 0805 (TRS)	940-2710501
R513	SMD 330R 0.1W5% RES 0805 (TRS)	940-3310501
R514	SMD 390R 0.1W5% RES 0805 (TRS)	940-3910501
R515	SMD 3K30.1W1% RES 0805 (TRS)	940-3320101
R516	SMD 330R 0.1W5% RES 0805 (TRS)	940-3310501
R517	SMD 0.1W5% ZEROHM LINK-0805 (TRS)	940-0000501
R519	SMD 0.1W5% ZEROHM LINK-0805 (TRS)	940-0000501
R520	SMD 100R 0.1W5% RES 0805 (TRS)	940-1010501
R521	SMD 470R 0.1W5% RES 0805 (TRS)	940-4710501
R522	SMD 120R 0.1W5% RES 0805 (TRS)	940-1210501
R523	SMD 75R0.1W5% RES 0805 (TRS)	940-7500501
R530	SMD 1K5 0.1W1% RES 0805 (TRS)	940-1520101
R531	SMD 220R 0.1W5% RES 0805 (TRS)	940-2210501
R532	SMD 0.1W5% ZEROHM LINK-0805 (TRS)	940-0000501
R533	SMD 0.1W5% ZEROHM LINK-0805 (TRS)	940-0000501
R534	SMD 0.1W5% ZEROHM LINK-0805 (TRS)	940-0000501
R535	SMD 47R0.1W5% RES 0805 (TRS)	940-4700501
R536	SMD 0.1W5% ZEROHM LINK-0805 (TRS)	940-0000501
R537	SMD 220R 0.1W5% RES 0805 (TRS)	940-2210501
R538	SMD 220R 0.1W5% RES 0805 (TRS)	940-2210501
R539	SMD 1K0.1W5% RES 0805 (TRS)	940-1020501
R540	SMD 1K0.1W5% RES 0805 (TRS)	940-1020501
R541	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R542	SMD 3K60.1W1% RES 0805 (TRS)	940-3620101
R543	1R00.25W 5% CARBON FILM RES	140-0102501
R544	1R00.25W 5% CARBON FILM RES	140-0102501
R545	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R546	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R547	SMD 2K20.1W5% RES 0805 (TRS)	940-2220501
R548	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R557	SMD 330R 0.1W5% RES 0805 (TRS)	940-3310501
R558	SMD 75R0.1W5% RES 0805 (TRS)	940-7500501
R559	SMD 220R 0.1W5% RES 0805 (TRS)	940-2210501
R560	SMD 2K20.1W5% RES 0805 (TRS)	940-2220501
R562	SMD 560R 0.1W5% RES 0805 (TRS)	940-5610501
R563	SMD 220R 0.1W5% RES 0805 (TRS)	940-2210501
R564	SMD 12R0.1W5% RES 0805 (TRS)	940-1200501
R565	SMD 220R 0.1W5% RES 0805 (TRS)	940-2210501
R566	SMD 12R0.1W5% RES 0805 (TRS)	940-1200501
R567	SMD 470R 0.1W5% RES 0805 (TRS)	940-4710501
R568	SMD 330R 0.1W5% RES 0805 (TRS)	940-3310501
R569	SMD 0.1W5% ZEROHM LINK-0805 (TRS)	940-0000501
R570	SMD 0.1W5% ZEROHM LINK-0805 (TRS)	940-0000501
R571	SMD 0.1W5% ZEROHM LINK-0805 (TRS)	940-0000501
R572	SMD 0.1W5% ZEROHM LINK-0805 (TRS)	940-0000501
R573	SMD 0.1W5% ZEROHM LINK-0805 (TRS)	940-0000501
R574	SMD 0.1W5% ZEROHM LINK-0805 (TRS)	940-0000501
R575	SMD 0.1W5% ZEROHM LINK-0805 (TRS)	940-0000501
R576	SMD 0.1W5% ZEROHM LINK-0805 (TRS)	940-0000501
R577	SMD 0.1W5% ZEROHM LINK-0805 (TRS)	940-0000501
R578	SMD 0.1W5% ZEROHM LINK-0805 (TRS)	940-0000501
R579	SMD 2K0.1W1% RES 0805 (TRS)	940-2020101
R580	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R581	SMD 22K0.1W5% RES 0805 (TRS)	940-2230501
R582	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R583	68R 2W5% METAL FILM RES TR	142-6806511
R584	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R585	SMD 0.1W5% ZEROHM LINK-0805 (TRS)	940-0000501
R586	SMD 0.1W5% ZEROHM LINK-0805 (TRS)	940-0000501
R587	SMD 0.1W5% ZEROHM LINK-0805 (TRS)	940-0000501
R588	SMD 220K 0.1W5% RES 0805 (TRS)	940-2240501
R590	SMD 1K1 0.1W 1% RES 0805 (TRS)	940-1120101
R591	SMD 47R0.1W5% RES 0805 (TRS)	940-4700501
R594	SMD 0.1W5% ZEROHM LINK-0805 (TRS)	940-0000501
R595	SMD 0.1W5% ZEROHM LINK-0805 (TRS)	940-0000501
R596	SMD 120R 0.1W5% RES 0805 (TRS)	940-1210501
R597	SMD 150R 0.1W5% RES 0805 (TRS)	940-1510501
R598	SMD 22K0.1W5% RES 0805 (TRS)	940-2230501
R599	SMD 22K0.1W5% RES 0805 (TRS)	940-2230501
R600	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R601	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R602	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R603	SMD 330R 0.1W5% RES 0805 (TRS)	940-3310501
R604	SMD 100R 0.1W5% RES 0805 (TRS)	940-1010501
R605	SMD 1K20.1W5% RES 0805 (TRS)	940-1220501
R606	SMD 1K20.1W5% RES 0805 (TRS)	940-1220501
R607	SMD 1K0.1W5% RES 0805 (TRS)	940-1020501
R609	SMD 2K70.1W5% RES 0805 (TRS)	940-2720501
R610	SMD 470R 0.1W5% RES 0805 (TRS)	940-4710501
R612	SMD 1K20.1W5% RES 0805 (TRS)	940-1220501
R613	SMD 1K20.1W5% RES 0805 (TRS)	940-1220501

Connectors

SK1	*A* LEONHARDY 07-78.2300 MAINS INPUT SKT	875-0778231
SK2	PHONO SOCKET-DUAL (JALCO YKC21-0061)	165-2000201
SK5	SCART SOCKET-MKF6341 (NO LUGS)	163-2102112
SK6	SCART SOCKET-MKF6341 (NO LUGS)	163-2102112
SK7	SCART SOCKET-MKF6341 (NO LUGS)	163-2102112

Integrated Circuits

U1	TEA2018 SWITCH MODE PSU (THOMSON)	109-0201801
U3	ULN2003 TRANSISTOR DARLINGTONS	100-0200300
U5	74LS139 DUAL 2 TO 4 LINE DECODER	101-0013900
U7	SL5066 VIDEO MODULATOR (PLESSEY)	109-0506601
U8	SP4633 SO PRESCALER (PLESSEY)	109-0463301
U9	NICKY MICRO 24 PIN DIP VER 2FS	109-0960101
U10	M50555 001P DISPLAY CONT (MISUBISHI)	109-0505551
U11	TDA6160 SAT SOUND IF (SIEMENS)	909-0616001
U12	LM324 QUAD OP AMP	100-0032400
U13	NE572 PROG. ANALOG COMPANDOR (PHILIPS)	100-0057201
U14	TL084 QUAD BI-FET OP AMP LOW NOISE	100-0008400
U15	TL084 QUAD BI-FET OP AMP LOW NOISE	100-0008400
U16	LM324 QUAD OP AMP	100-0032400
U17	4052	106-0405200
U18	TEA2130 SYNC SEP(DS173019) (THOMSON)	109-0213001
U19	HEF4053 TRIPLE 2-CHANNEL MULTIPLEXER	106-0405301
U20	SP973T8 8 BIT ADC (PLESSEY)	109-0973800
U21	UPD41101C-1/2/3 (NEC)	109-0411001
U22	UPD41101C-1/2/3 (NEC)	109-0411001
U23	SN74ALS541N OCTAL BUFFER/LINE DR/RX (TI)	101-1054101
U24	MV95308 8 BIT DAC (PLESSEY)	109-9530801
U25		109-0160301
U26	SMD IC-74LS04	901-1000400
U27		109-0504501
U28		109-0680501
U29		109-0805201
U30	SMD IC-74LS74	901-1007401
U31	SMD IC-74LS74	901-1007401
U32	SMD IC-74LS03	901-1000301
U35	HEF4053 TRIPLE 2-CHANNEL MULTIPLEXER	106-0405301

Miscellaneous Components

CAN 1	MODULATOR SCREENING CAN-FRAME REV 2	315-0235101
	SILICONE RUBBER ADHESIVE	206-0374400
	FS1 FUSECLIP-PFC5000-0202 (SMK)	201-7500001
	REG HEATSINK-TO220C PUSH-ON	202-0022000
FS1	*A* FUSE 1A 20 X 5MM GLASS ANTI-SURGE	201-2511000
J1-J13	TINNED COPPER WIRE LINKS 0.61MM DIA.(TRS	999-1099901
REG 1	V/REGULATOR-LM7812+12V 1.5A TO-220	105-0781200
T1	MAINS FILTER-(UF2327S-253-YOR5) "TDK"	232-2327000
T2	*A* TRANSFORMER-SM MANBY 800 SERIES	237-0400002
TST1-5	TEST PIN	161-1000100
X2	XTAL 17.734MHZ HC18U 20/30/10 30PF PAR	170-0177340

X3	FILTER-SFE 10.52MJA 10K-A(MURATA)	173-0105203
X4	FILTER-SFE 10.52MJA 10K-A(MURATA)	173-0105203
X5	FILTER-SFE 10.7MJA 10K-A(MURATA)	173-0107003
X6	FILTER-SFE 10.7MJA 10K-A(MURATA)	173-0107003
X7	RESONATOR-503KHZ TYPE CSB503F21	171-0005030
X8	XTAL 28MHZ HC18U 50/100/-20/30PF PAR 3RD	170-0280000

ELECTRICAL PARTS UNIQUE TO SINGLE INPUT RECEIVER

R589	SMD 0.1W5% ZEROHM LINK-0805 (TRS)	940-0000501

ELECTRICAL PARTS UNIQUE TO DUAL INPUT RECEIVER

C101	SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR	950-1042951
C102	SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR	950-1042951
C297	SMD 6K80.1W5% RES 0805 (TRS)	940-6820501
C298	100UF 25V 5MMRADIAL ELECT' CAPTR	155-1072751
D72	SMD DIODE-BAS16 SOT-23	912-0001651
D73	SMD DIODE-BAS16 SOT-23	912-0001651
D74	SMD DIODE-BAR43 SOT-23 (TRS)	912-0004351
Q16	SMD TRANSISTOR-BC856B SOT-23	911-1085651
Q17	SMD TRANSISTOR-BC856B SOT-23	911-1085651
Q58	SMD TRANSISTOR-BC846B SOT-23	911-1084651
Q59	SMD TRANSISTOR-BC846B SOT-23	911-1084651
Q60	TRANSISTOR-FTX749 (ZETEX)TR	110-0074911
Q61	TRANSISTOR-FTX749 (ZETEX)TR	110-0074911
R136	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R137	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R138	SMD 1K0.1W5% RES 0805 (TRS)	940-1020501
R139	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R140	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R141	SMD 1K0.1W5% RES 0805 (TRS)	940-1020501
R478	SMD 22K0.1W5% RES 0805 (TRS)	940-2230501
R479	SMD 22K0.1W5% RES 0805 (TRS)	940-2230501
R480	SMD 270R 0.1W5% RES 0805 (TRS)	940-2710501
R481	SMD 270R 0.1W5% RES 0805 (TRS)	940-2710501
R482	SMD 270R 0.1W5% RES 0805 (TRS)	940-2710501
R483	SMD 270R 0.1W5% RES 0805 (TRS)	940-2710501
R484	SMD 270R 0.1W5% RES 0805 (TRS)	940-2710501
R485	SMD 270R 0.1W5% RES 0805 (TRS)	940-2710501
R486	SMD 270R 0.1W5% RES 0805 (TRS)	940-2710501
R487	SMD 270R 0.1W5% RES 0805 (TRS)	940-2710501
R488	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R489	SMD 10K0.1W5% RES-0805 (TRS)	940-1030501
R550	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501
R552	SMD 4K70.1W5% RES 0805 (TRS)	940-4720501

PARTS FOR µP SUB-ASSEMBLY BOARD

C3	100NF 50V 5MM M/LAYER CER.CAP TR	157-1045751
C4	100NF 50V 5MM M/LAYER CER.CAP TR	157-1045751
C5	33PF 16V 5MMCERAMIC CAP 10% TR	150-3301651
C6	33PF 16V 5MMCERAMIC CAP 10% TR	150-3301651
	INS.WASHER-FOR HC18/49 (HOLED) X1 CAN	208-0153000
PL 1	PIN HEADER-20 WAY EXT'D S/ROW(HARWIN)	161-1002001
	REV A1 PCB-OTP 800 SERIES REV A1	182-0185101
U1	SMD IC-Z86C9620VSC ROMLESS Z8	904-0869601
U3	74LS374 OCTAL D TYPE LATCH	101-0037400
U4	EPROM-27256 PACE PRD ONLY(VER 2)	805-0800102
X1	CRYSTAL-4MHZ HC18U 50/50/-10+60 30PF PAR	170-0040000

MECHANICAL PARTS COMMON TO SINGLE AND DUAL INPUT RECEIVERS

1 OFF	PAPER WIRE TIE 4"	206-0040000
4 OFF	BUMPON-SJ5003 SMALL BLACK DOME	208-5003010
2 OFF	BATTERY-AA	239-0015010
6 OFF	SCREW M3x8 P/P TAP.C/W WASHER BLK SEAL	246-3080011
3 OFF	SNAP RIVET-SR3555B BLACK PLASTIC RICHCO	247-3555111
1 OFF	BAG-POLYTHENE FOR LEADS	400-1080400
1 OFF	BAG-POLYTHENE FOR MKII SAT.REC.	400-1141700

LATE CHANGES

Changes to Circuit Diagram C

As Circuit Diagram C is printed using special techniques, it went to print before the rest of this manual. The following changes are therefore included in the parts lists in the manual but are not shown on Circuit Diagram C:

- R590 is part of a potential divider used to set the black level on the VideoCrypt graphics. Because this level produced graphics on the grey side, the value of R590 was changed from 1.1 kΩ to 1.2 kΩ (ECO 000368). When, however, ECO S000014 (see below) was implemented, the DC level out of the DAC was affected, causing the black level to go into the sync and thereby causing the VideoCrypt graphics to break up. To solve this problem, R590 was changed back to its original value of 1.1 kΩ (ECO S000026).
- R591 was 22 Ω, but is now 47 Ω, R513 was 360 Ω, but is now 330 Ω and R331 was 1.2 kΩ, but is now 1.5 kΩ 1% (ECO 000368).
- C249 was 2.2 µF 16 V, but is now 10 µF 25 V (ECO 000376).
- C228 was changed from 100 nF to 1 nF and a 1 MΩ, 0.25 W resistor was retrofitted between the +5 V rail and pin 11 of U24 (ECO S000014). This is to cure latchup of the band gap reference in the DAC. The symptoms of this are that, on a VideoCrypt programme, the screen goes black but the VideoCrypt graphics can still be seen and the voltage on pin 11 of U24 is not 1 V.

ECO S000040 details the incorporation (into Revision B1 of the PCB) of two components which will replace the retrofitted 1 MΩ resistor mentioned above and the retrofitted 82 µH inductor shown on Circuit Diagram A. These components are:

- R611 (SMD 1M 0.1W 5% Resistor - Part no. 940-1050501);
- L56 (Axial Inductor - 82 µH 5% - Part no. 130-0820501.

Two ECOs were implemented to improve the performance of the receiver, especially to overcome sparklies:

- C564 is now not fitted (ECO S000010);
- L53 was an RF bead, but is now a 100 Ω 0.25 W resistor
  and L52 was an RF bead, but is now a wire link
  and C340 was 22 pF, but is now 47 pF
  and C250 was not fitted, but is now fitted and is 22 pF
  and R360 was 0 Ω, but is now 100 Ω (all ECO S000026).

Removal of an Earth Loop

It has been discovered that the presence of an earth connection at the LNB connector and a separate earth connection at taptite screw F (see Figure 3 in the section entitled Gaining Access to the Unit) could lead to an earth loop. Such an earth loop can cause thin diagonal lines to appear on the picture, these being mainly noticeable when the receiver is connected using the UHF output (TV connector). A cut has therefore been made in the copper track leading to screw F in order to isolate this point (ECO S000022). Revision B1 of the PCB does not require this cut.

Replacement of Microprocessor Sub-assembly Board by U2

As of 21.11.92, ECOs 0000308, S000030 and S000035 should come into effect. These detail the substitution of the microprocessor sub-assembly board by the dedicated microprocessor U2 (8661 Proc PRD Ser - Part no. 809-8661001). At the same time, crystal X1 will need to move back onto the main PCB, and the following capacitors re-fitted:

- C32 (SMD 33 pF 50V 5% Cer Cog Cap - Part no. 950-3305501);
- C33 (SMD 22 pF 50V 5% Cer Cog Cap - Part no. 950-2205501).

Also, on single input receivers, the IC U6 will need to change to Cat 24C08 8k-Bit serial EEPROM - Part no. 104-0240802.

As of 31.12.92, ECO 000408 should come into effect. This details the change of IC U2 to the following: 8661 Proc PRD Ser - Part no. 809-8661004.

Component Ident Errors

Electrolytic capacitors C166, C182 and C276 have their component ident on the PCB reversed. To take account of this error, each needs to be mounted so that its negative leg (indicated by a black stripe on the capacitor body) is fitted into the hole marked by +, although there are no serious problems if they are left incorrect (ECO S000033 - note that it only applies to board revisions A3 and A5). ECO S000040 details the changes required to the idents to correct the problem for the Revision B1 PCB.

Other Changes

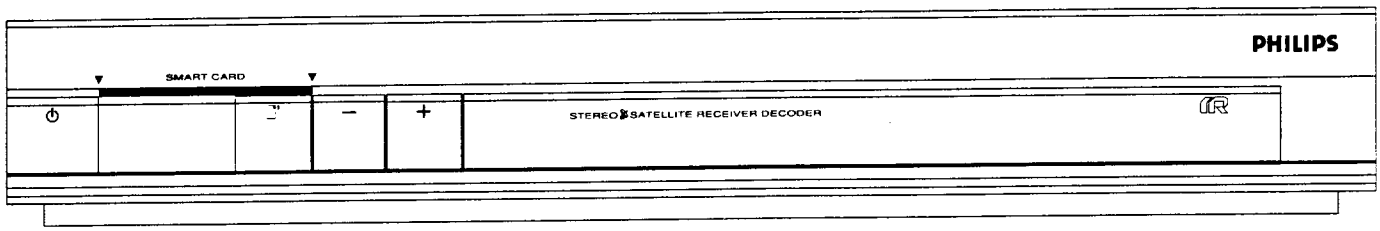
- As of 25.09.92, C10 will become an SMD 47 nF 50 V 10% Cer X7R Cap 0805 - Part no. 950-4735621 because of supply difficulties with the original part (PCO S000003).
- As of 10.11.92, video processing IC U9 will change from Version 2FS to Version 2 (Part no. 109-0960102) as detailed in ECO 000396.
- As of 9.10.92, R583 will become a 82 Ω 3 W 5% M/Film Res (FA85) - Part no. 142-8207511 in order to reduce its operating temperature (ECO 000416).
- As of 16.10.92, the lid of the modulator can will contain a 5.5 mm hole so that the sound coil L7 in the modulator can be adjusted after the lid has been fitted (ECO S000011).
- As of 6.11.92, adjustable coils L15 and L16 will become 10.7 MHz ±3% Adj coil type FH-7 - Part no. 133-2868704; as these include a capacitor, C305 and C306 will no longer be fitted (PCO S000002).

SPECIAL FEATURES OF THE PHILIPS STU802/05M *(NOTE: This is a single input receiver.)*

The Philips STU802/05M receiver has a slightly different front panel from that described in the main pages of this manual. The ▲ button is replaced by +, the ▼ button by — and the authorise button by □.

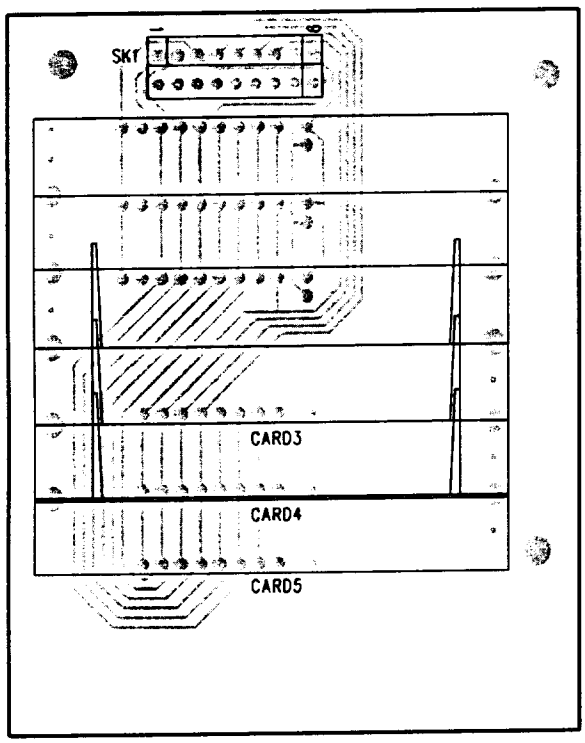
These front panel buttons are associated with different switch positions on the main PCB namely SW2, SW1, SW4 and SW3, rather than SW4, SW7, SW6 and SW5.

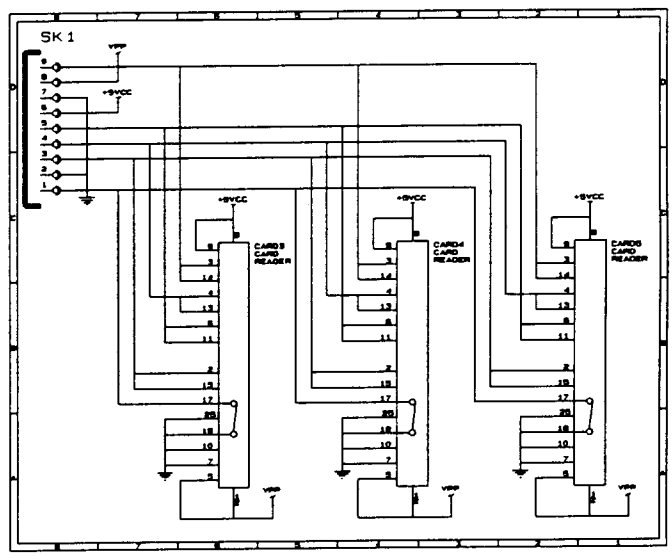
As the card slot is positioned higher on the front panel, the unit contains an off-the-board card reader which is described below.



OFF-THE-BOARD CARD READER

The small PCB which contains the off-the-board card reader, its circuit diagram and parts list are shown below. The card reader is at position CARD5. The main PCB does not have a card reader assembled on it.





ELECTRICAL PARTS UNIQUE TO STU802/05M

	U2 SOCKET 20 WAY TOP ENTRY (HARWIN)	161-2002001
LED 9	3-UNIT 7-SEG DISPLAY RED (PHILIPS)	200-7030103
IR1	SONY INFRA-RED RECEIVER MODULE	215-1620002
MOD1	BSFC75G00 SGL INPUT F'TUNER (SHARP 22CC)	221-2075001
SW1	SWITCH-B3F3152 PCB SUBMIN 150GM (YELL)	204-0315211
SW2	SWITCH-B3F3152 PCB SUBMIN 150GM (YELL)	204-0315211
SW3	SWITCH-B3F3152 PCB SUBMIN 150GM (YELL)	204-0315211
SW4	SWITCH-B3F3152 PCB SUBMIN 150GM (YELL)	204-0315211
U4	ULN2003 TRANSISTOR DARLINGTONS	100-0200300
U6	24C08 8K EE (EXEL)	104-0240801
PL1	HEADER- 9 WAY EXTENDED MOLEX	161-1010921
J12	TINNED COPPER WIRE LINKS 0.61MM DIA.(TRS)	999-1099901

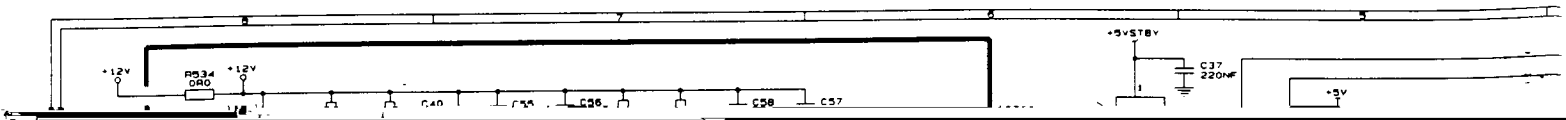
NOTE: Because J12 is fitted on this receiver, J13 is not fitted.

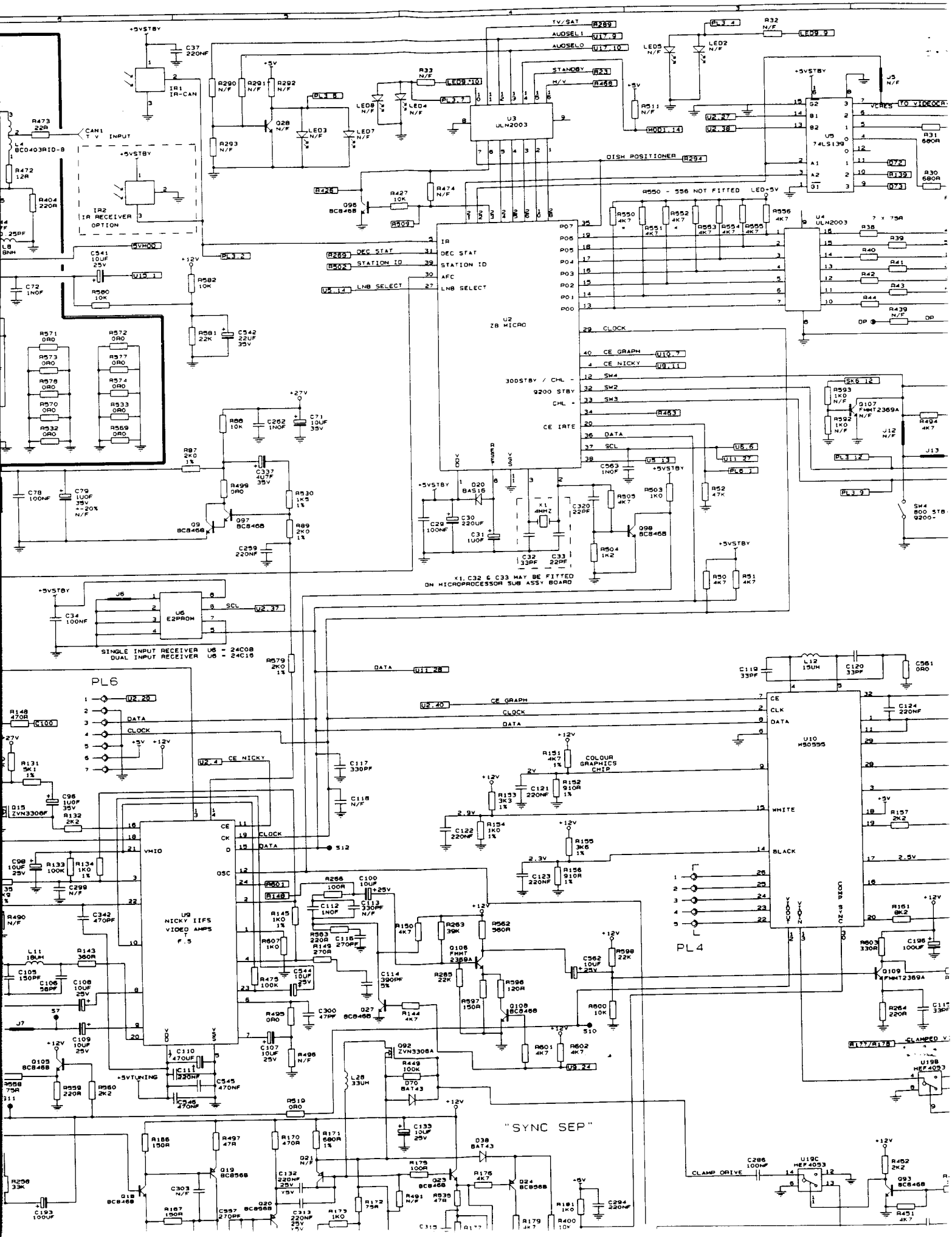
PARTS FOR OFF-BOARD CARD READER

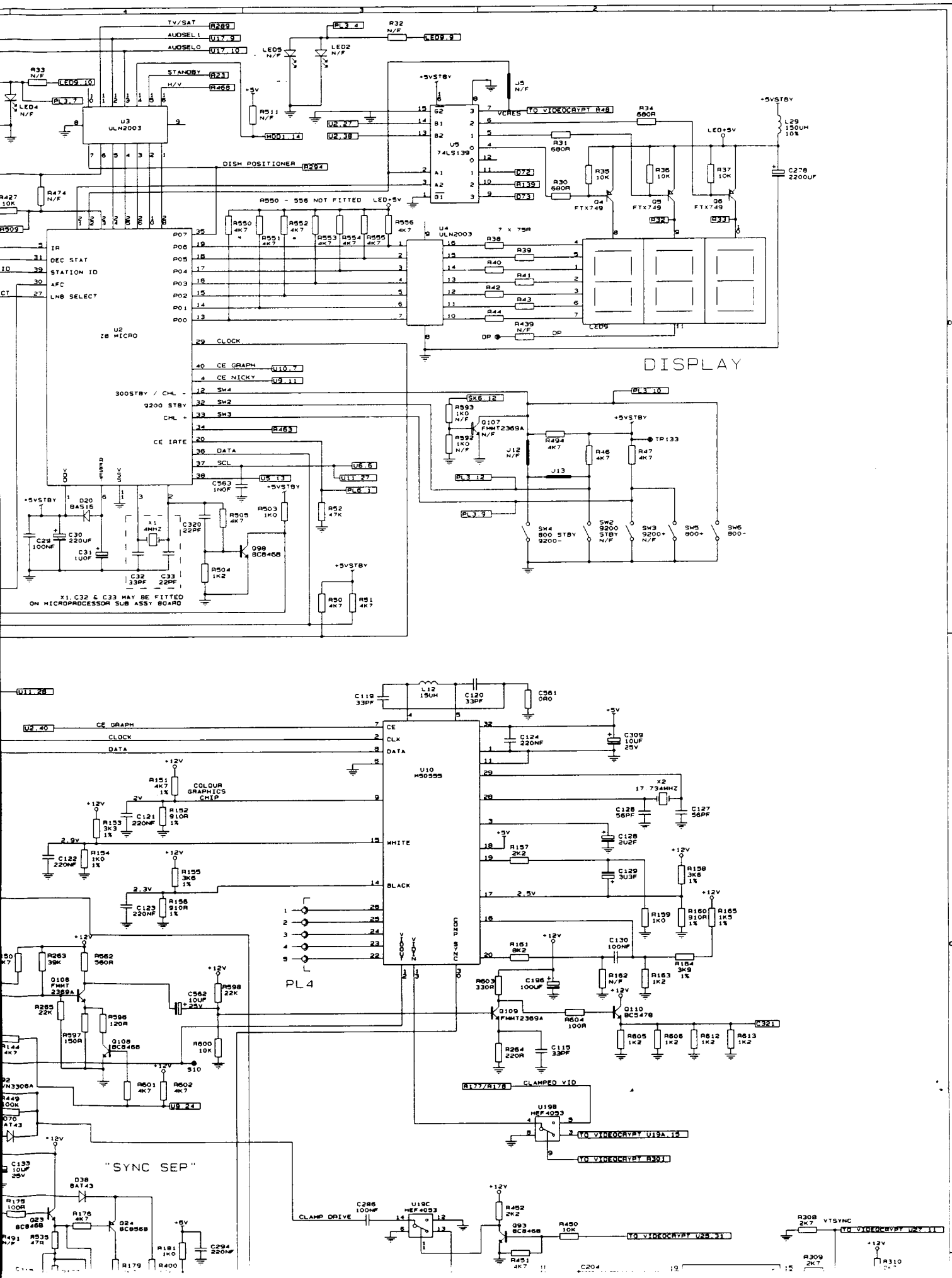
	PCB-CARD READER 800 SETRIES REV A1	181-0187101
CARD5	SMT CARD READER-ALCATEL7001LM0416T2F08	870-7001001
SK1	SOCKET 9-WAY	161-2000900

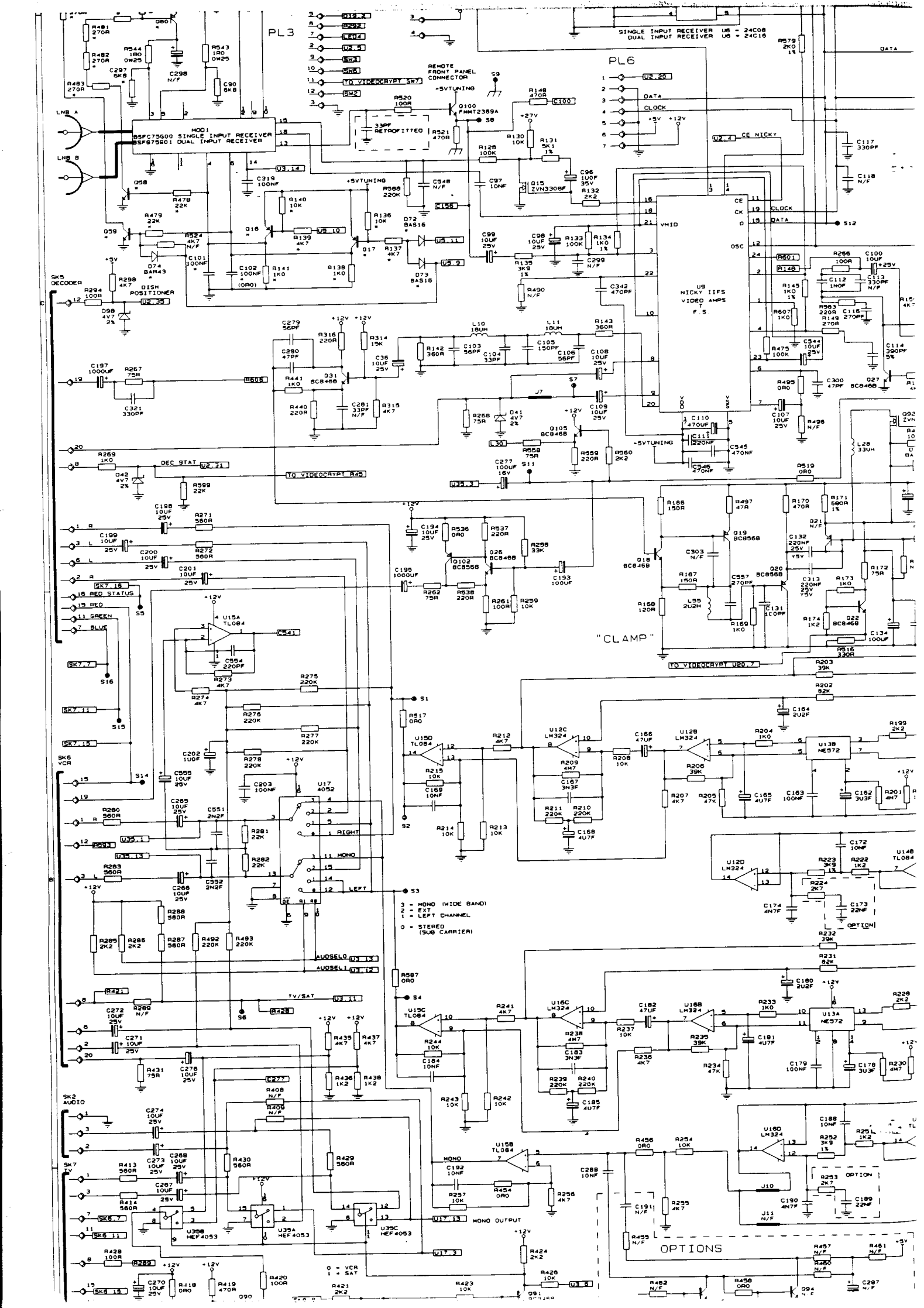
MECHANICAL PARTS UNIQUE TO STU802/05M

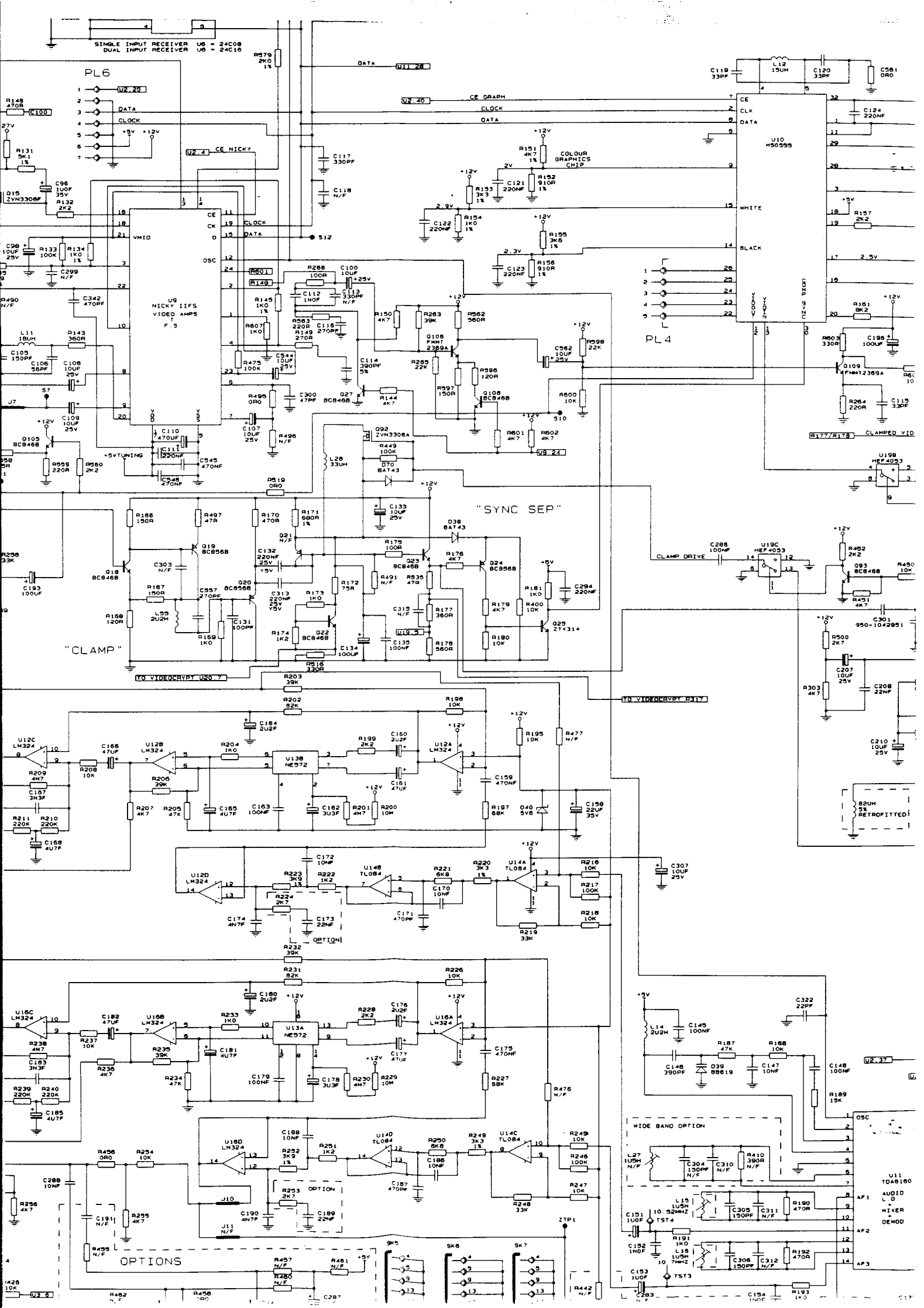
	RIBBON-SCRATCH/SOLVENT RESISTANT	300-0328320
	LABEL 76X121MM SILVER MET POLY 2 PART	300-0761210
1 OFF	BASE-800 UNIV.PRE-COAT PRINT.(NON-PANDA)	321-0800103
1 OFF	PHILIPS PRD800/SCC222 CARTON (WHITE)	412-0378910
1 OFF	CARTON LABEL PHILIPS STU802/05M	297-0300600
2 OFF	POLYSTYRENE 700/800/900 SERIES	442-7890001
1 OFF	PHILIPS STU802/05M MANUAL	502-0800030
1 OFF	PHILIPS STU802//05M HANDSET	699-0800030
2 OFF	PLASTITE SCREW-4 X 1/4 POZI PAN BLACK	245-4140011
1 OFF	COVER-700/800/900 SERIES (GREY) HITMET	312-7890010
2 OFF	PILLAR-LCBS-14 (RICHCO)	248-0014002
3 OFF	PILLAR-LCBS-12 V/CRYPT STAND-OFF(RICHCO)	248-0012001
2 OFF	PILLAR-SP1-6-01 STAND-OFF (RICHCO)	248-1601001
1 OFF	HALF NUT-3/8 FORM 32 TOI.2A	240-1380011
1 OFF	"A" MAINS CABLE-UK "8" SS9000	191-1015280
1 OFF	BLANKING GROMMET FOR S/LNB OPTION	306-7890000
1 OFF	CABLE-COAX UHF MALE TO FEMALE	198-0015021
1 OFF	PRD/PSR PROG LISTING SHEET UNBRANDED	504-1800000
1 OFF	PHILIPS BAR CODE LABEL 2 PT (627-0800030)	297-0300700
1 OFF	PHILIPS STU802/05M FRONT PANEL PRINTED	360-1800030

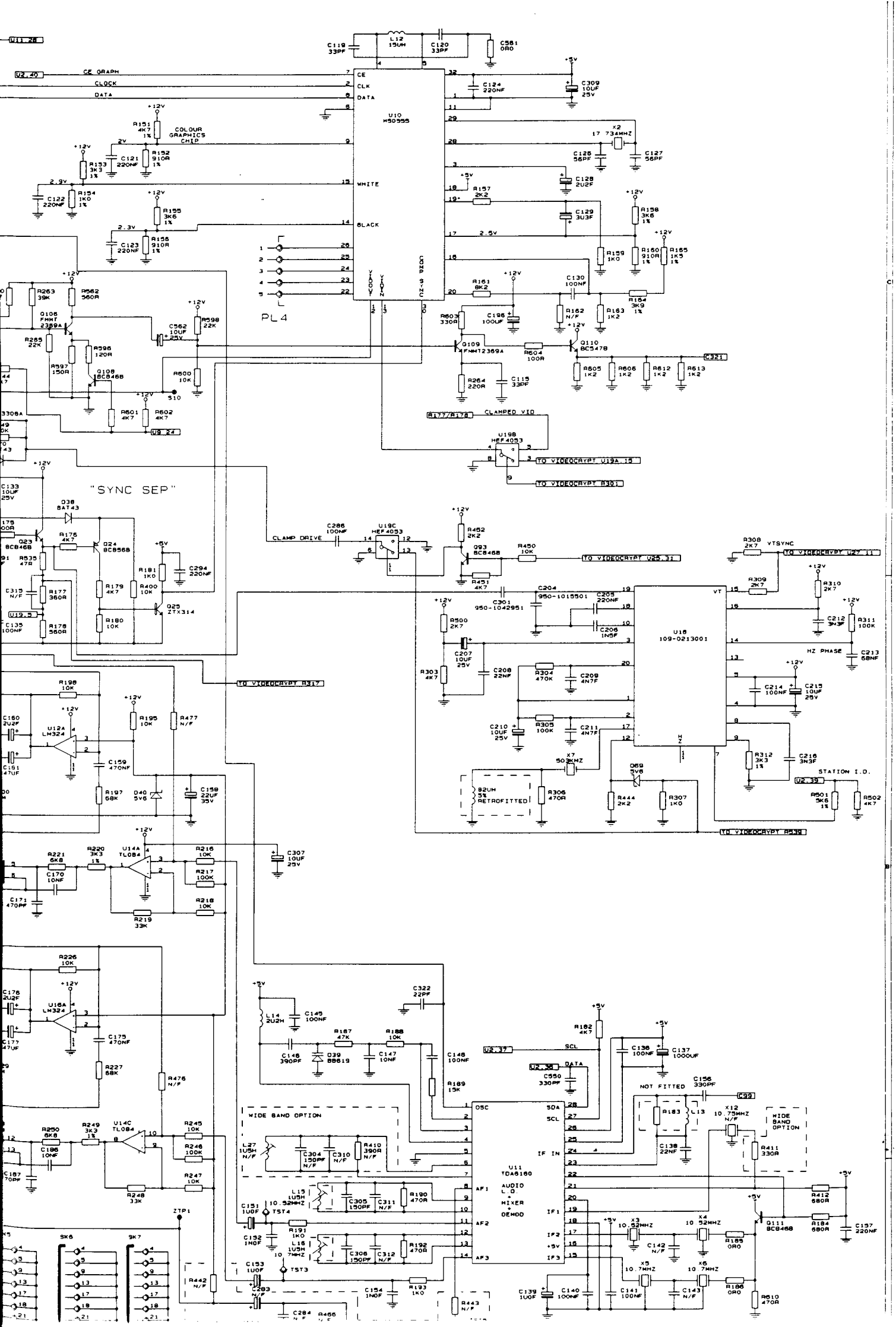

+12V
R934
0R0
+12V
C40
C56
C58
C57
+5VSTBY
C37
220NF
+5V

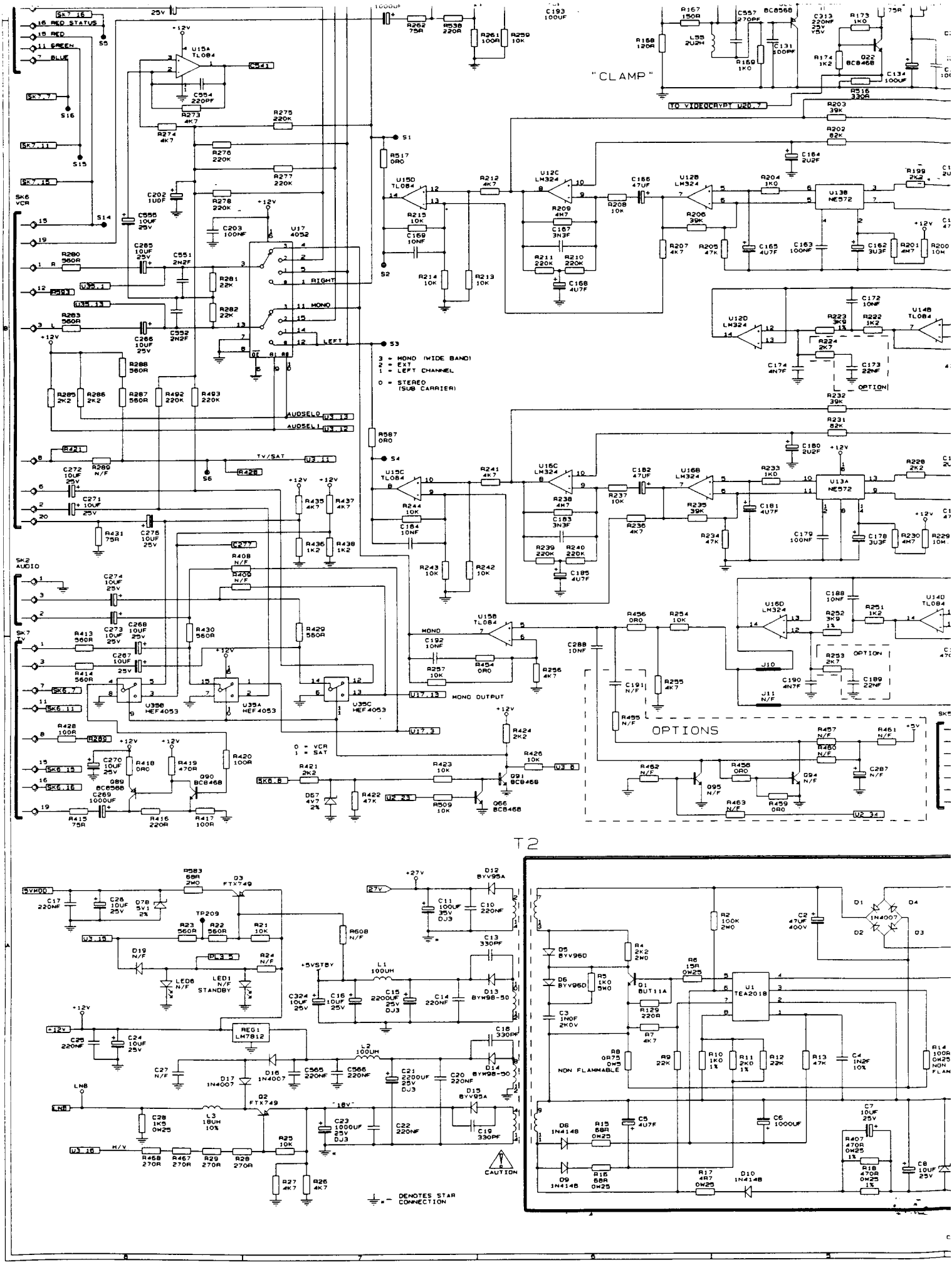

+5VSTBY
C37 220NF
IR1 IR-CAN
CAN1 T V INPUT
L4 BC0403RID-8
R473 22R
R472 12R
R404 220R
IR2 IR RECEIVER OPTION
+5VMOD
C541 10UF 25V
R580 10K
C72 1NOF
+12V
R582 10K
R581 22K
C542 22UF 35V
R571 0R0
R572 0R0
R573 0R0
R577 0R0
R576 0R0
R574 0R0
R570 0R0
R533 0R0
R532 0R0
R569 0R0
+27V
R86 10K
C262 1NOF
C71 10UF 35V
R87 2K0 1%
C337 407F 35V
R499 0R0
R530 1K5 1%
Q9 BC8468
Q97 BC8468
R89 2K0 1%
C259 220NF
C78 100NF
C79 1U0F 35V +-20% N/F
+5VSTBY
J6
U6 E2PROM
C34 100NF
SCL
U2.37
SINGLE INPUT RECEIVER U6 = 24C08
DUAL INPUT RECEIVER U6 = 24C16
R579 2K0 1%
PL6
U2.20
DATA
CLOCK
+5V +12V
U2.4 CE NICKY
R148 470R
C100
R131 5K1 1%
C96 1U0F 35V
Q15 ZVN3306F
R132 2K2
C98 10UF 25V
R133 100K
R134 1K0 1%
C299 N/F
C342 470PF
R490 N/F
L11 18UH
R143 360R
C105 150PF
C106 56PF
C108 10UF 25V
J7
C109 10UF 25V
Q105 BC8468
R559 220R
R560 2K2
+5VTUNING
U9 NICKY IIFS VIDEO AMPS T F.5
VMID
CE
CK
D
OSC
CLOCK
DATA
S12
C110 470UF
C111 220NF
C545 470NF
C546 470NF
R601
R148
R145 1K0 1%
R607 1K0
R475 100K
C544 10UF 25V
R495 0R0
C300 47PF
C107 10UF 25V
R496 N/F
R519 0R0
C117 330PF
C118 N/F
C112 1NOF
C113 330PF N/F
R149 270R
C115 270PF
R563 220R
R266 100R
C100 10UF +25V
C114 390PF 5%
Q27 BC8468
R144 4K7
R150 4K7
R263 39K
R562 360R
Q108 FMMT 2369A
R285 22K
R596 120R
R597 150R
Q106 BC8468
C562 10UF +25V
R598 22K
R600 10K
R601 4K7
R602 4K7
U9.24
Q92 ZVN3308A
R449 100K
D70 BAT43
L28 33UH
C133 10UF 25V
"SYNC SEP"
D38 BAT43
R179 100R
Q23 BC8468
R176 4K7
Q24 BC8568
R491 4K7
R935 47R
R181 1K0
C294 220NF
R400 10K
R186 150R
R497 47R
R170 470R
R171 680R 1%
Q21 N/F
C132 220NF 25V
Y5V
Q19 BC8568
Q18 BC8468
C303 N/F
R187 150R
C557 270PF
Q20 BC8568
C313 220NF 25V Y5V
R173 1K0
R172 75R
C315
R177
R236 33K
C193 100UF
TV/SAT R289
AUDSEL1 U17.9
AUDSEL0 U17.10
STANDBY R23
M/V R466
R33 N/F
LED9.10
PL3.7
PL3.6
R290 N/F
R291 N/F
R292 N/F
R293 N/F
Q28 N/F
LED8 N/F
LED4 N/F
LED3 N/F
LED7 N/F
U3 ULN2003
R511 N/F
MOD1.14
LED5 N/F
LED2 N/F
R32 N/F
LED9.9
PL3.4
+5VSTBY
J5 N/F
U5 74LS139
VCBES
TO VIDEOCR
U2.27
U2.38
R31 680R
R30 680R
Q72
R139
Q73
DISH POSITIONER R294
R425
R427 10K
R474 N/F
Q96 BC8468
R509
R550 - 556 NOT FITTED
LED+5V
R550 4K7
R551 4K7
R552 4K7
R553 4K7
R554 4K7
R555 4K7
R556 4K7
U4 ULN2003
7 x 75R
R38
R39
R40
R41
R42
R43
R44
R439 N/F
DP
U2 Z8 MICRO
IR
DEC STAT R289
STATION ID R502
AFC
LNB SELECT U5.14
P07
P06
P05
P04
P03
P02
P01
P00
CLOCK
CE GRAPH U10.7
CE NICKY U9.11
SW4
SW2
SW3
CE IRATE
DATA
SCL
U5.6
U5.13
U11.27
PL6.1
300STBY / CHL -
9200 STBY
CHL +
R463
C563 1NOF
+5VSTBY
R503 1K0
R505 4K7
R52 47K
D20 BAS16
C29 100NF
C30 220UF
C31 1U0F
X1 4MHZ
C320 22PF
C32 33PF
C33 22PF
Q98 BC8468
R504 1K2
R50 4K7
R51 4K7
X1, C32 & C33 MAY BE FITTED ON MICROPROCESSOR SUB ASSY BOARD
SK6 12
R593 1K0 N/F
Q107 FMMT2369A N/F
R592 1K0 N/F
R494 4K7
J12 N/F
J13
PL3.12
PL3.9
SW4 STB 9200-
DATA U11.28
U2.40 CE GRAPH
CLOCK
DATA
C119 33PF
L12 15UH
C120 33PF
C561 0R0
U10 H90355
CE
CLK
DATA
WHITE
BLACK
COLOUR GRAPHICS CHIP
R151 4K7 1%
R152 910R 1%
C121 220NF
R133 3K3 1%
R154 1K0 1%
C122 220NF
R155 3K6 1%
R156 910R 1%
C123 220NF
C124 220NF
R157 2K2
R161 8K2
R603 330R
C198 100UF
Q109 FMMT2369A
R264 220R
C115 33PF
R177/R178
CLAMPED V
U19B HEF4053
PL4
CLAMP DRIVE
C286 100NF
U19C HEF4053
R452 2K2
Q93 BC8468
R451 4K7

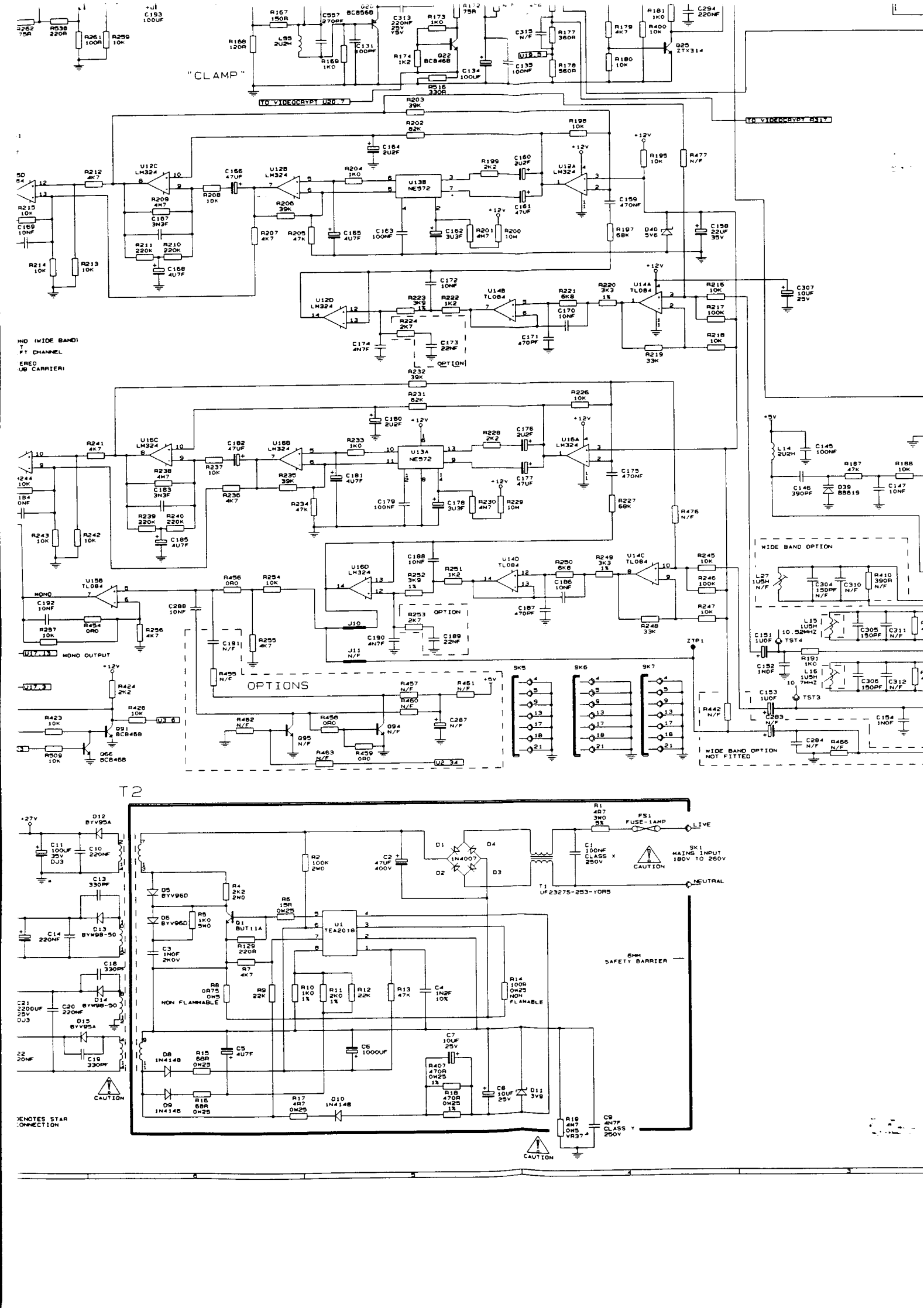

DISPLAY
"SYNC SEP"
PL4
U2 Z8 MICRO
U10 MS0355
U3 ULN2003
U4 ULN2003
U5 74LS139
U9 74HC4053
U19C HEF4053
U19B HEF4053
U19A HEF4053
X1 4MHZ
X2 17.734MHZ
DISH POSITIONER
CLAMP DRIVE
CLAMPED VID
VTSYNC
CE GRAPH
CLOCK
DATA
CE NICKY
CE IATE
IR
DEC STAT
STATION ID
AFC
LNB SELECT
CLOCK
SCL
SW2
SW3
SW4
SW5
SW6
CHL +
CHL -
9200 STBY
300STBY / CHL -
TV/SAT
AUOSEL1
AUOSEL0
STANDBY
H/V
LED+5V
+5VSTBY
TO VIDEOCRYPT R48
TO VIDEOCRYPT U19A.15
TO VIDEOCRYPT R301
TO VIDEOCRYPT U25.31
TO VIDEOCRYPT U27.11
COLOUR GRAPHICS CHIP
R550 - 556 NOT FITTED
X1, C32 & C33 MAY BE FITTED ON MICROPROCESSOR SUB ASSY BOARD
SW4 800 STBY 9200-
SW2 9200 STBY N/F
SW3 9200+ N/F
SW5 800+
SW6 800-

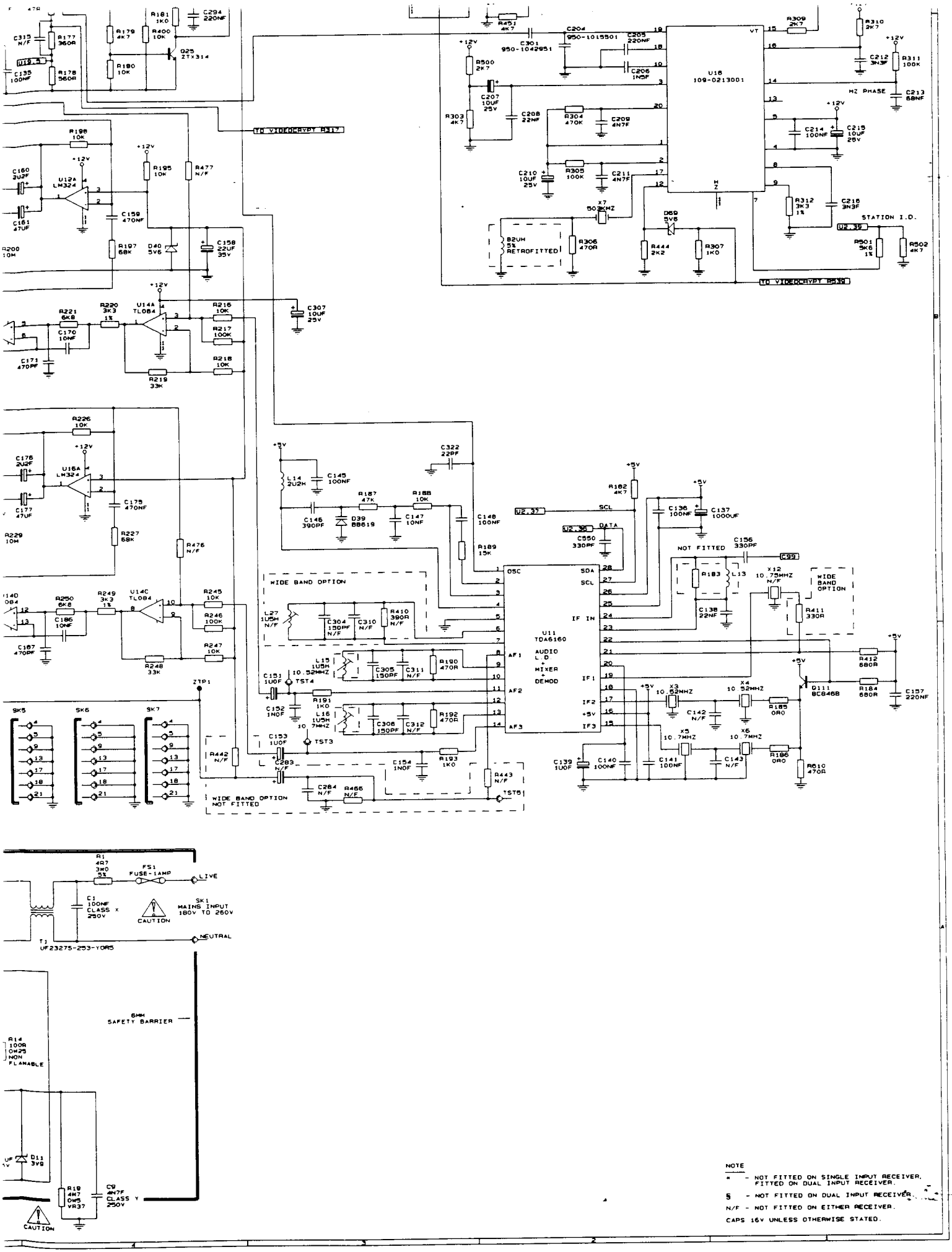

PL3
PL6
SINGLE INPUT RECEIVER U6 = 24C08
DUAL INPUT RECEIVER U6 = 24C16
REMOTE FRONT PANEL CONNECTOR
MOD1
BSF675G00 SINGLE INPUT RECEIVER
BSF675B01 DUAL INPUT RECEIVER
LNB A
LNB B
+5VTUNING
U9 NICKY IIFS VIDEO AMPS
VMID
OSC
CE
CK
D
DATA
CLOCK
U2.4 CE NICKY
SK5 DECODER
DISH POSITIONER
DEC STAT U2.31
TO VIDEOCRYPT R45
TO VIDEOCRYPT SW7
TO VIDEOCRYPT U20.7
"CLAMP"
SK7.16 16 RED STATUS
15 RED
11 GREEN
7 BLUE
SK7.7
SK7.11
SK7.15
SK6 VCR
SK2 AUDIO
SK7 TV
U15A TL084
U15B TL084
U15C TL084
U15D TL084
U16A LM324
U16B LM324
U16C LM324
U16D LM324
U17 4052
U35A HEF4053
U35B HEF4053
U35C HEF4053
U13A NE572
U13B NE572
U14A TL084
U14B TL084
RIGHT
MONO
LEFT
AUDSEL0
AUDSEL1
TV/SAT
MONO OUTPUT
3 = MONO (WIDE BAND)
2 = EXT
1 = LEFT CHANNEL
0 = STEREO (SUB CARRIER)
0 = VCR
1 = SAT
OPTION
OPTIONS


SINGLE INPUT RECEIVER U8 = 24C08
DUAL INPUT RECEIVER U8 = 24C16
PL6
PL4
U9
NICKY IIFS
VIDEO AMPS
F.S
U10
M50955
COLOUR
GRAPHICS
CHIP
"SYNC SEP"
"CLAMP"
CLAMP DRIVE
OPTION
OPTIONS
WIDE BAND OPTION
U11
TDA6160
AUDIO
L.O
MIXER
DEMOD
U138
NE572
U13A
NE572
U19C
HEF4053
U19B
HEF4053
U19A
HEF4053
U198
HEF4053
DATA
CLOCK
CE GRAPH
CE NICKY
VIDEOCRYPT
82UH
5%
RETROFITTED


U11.28
L12 15UH
C119 33PF
C120 33PF
C581 0R0
U2.40
CE GRAPH
CLOCK
DATA
U10 M50555
COLOUR GRAPHICS CHIP
C124 220NF
C309 10UF 25V
X2 17.734MHZ
C128 56PF
C127 56PF
C128 2U2F
C129 3U3F
R151 4K7 1%
R152 910R 1%
R153 3K3 1%
C121 220NF
R154 1K0 1%
C122 220NF
R155 3K6 1%
R156 910R 1%
C123 220NF
R157 2K2
R158 3K6 1%
R159 1K0
R160 910R 1%
R165 1K5 1%
R161 8K2
C130 100NF
R162 N/F
R163 1K2
R164 3K9 1%
R603 330R
C196 100UF
Q109 FMMT2369A
Q110 BC5478
R604 100R
C321
R605 1K2
R606 1K2
R612 1K2
R613 1K2
R264 220R
C115 33PF
PL4
R263 39K
R562 360R
Q106 FMMT 2369A
R598 22K
C562 10UF 25V
R265 22K
R596 120R
R597 150R
Q108 BC8468
R600 10K
S10
R601 4K7
R602 4K7
U9.24
R177/R178
CLAMPED VID
U19B HEF4053
TO VIDEOCRYPT U19A.15
TO VIDEOCRYPT R301
"SYNC SEP"
C133 10UF 25V
D38 BAT43
Q23 BC8468
R175 4K7
Q24 BC8568
R635 47R
C315 N/F
R177 360R
U19.5
C135 100NF
R178 560R
R181 1K0
R400 10K
C294 220NF
R179 4K7
R180 10K
Q25 ZTX314
C286 100NF
U19C HEF4053
CLAMP DRIVE
R452 2K2
Q93 BC8468
R450 10K
TO VIDEOCRYPT U25.31
R451 4K7
R308 2K7
VTSYNC
TO VIDEOCRYPT U27.11
R309 2K7
R310 2K7
C204 950-1015501
C205 220NF
C301 950-1042951
C206 1N5F
R500 2K7
C207 10UF 25V
C208 22NF
R303 4K7
U18 109-0213001
VT
HZ PHASE
C212 3N3F
R311 100K
C213 68NF
R304 470K
C209 4N7F
C214 100NF
C215 10UF 25V
C210 10UF 25V
R305 100K
C211 4N7F
X7 503.4MHZ
82UH 5% RETROFITTED
R306 470R
D59 5V6
R444 2K2
R307 1K0
R312 3K3 1%
C216 3N3F
STATION I.D.
U2.39
R501 5K6 1%
R502 4K7
TO VIDEOCRYPT R317
R198 10K
U12A LM324
R195 10K
R477 N/F
C160 2U2F
C161 47UF
C159 470NF
R197 68K
D40 5V6
C158 22UF 35V
C307 10UF 25V
R221 6K8
R220 3K3 1%
U14A TL084
R216 10K
R217 100K
C170 10NF
C171 470PF
R218 10K
R219 33K
R226 10K
U16A LM324
C176 2U2F
C177 47UF
C175 470NF
R227 68K
R476 N/F
C322 22PF
L14 2U2H
C145 100NF
R187 47K
R188 10K
C148 390PF
D39 BB619
C147 10NF
C146 100NF
R189 15K
R250 6K8
R249 3K3 1%
U14C TL084
R245 10K
R246 100K
C186 10NF
C187 470PF
R247 10K
R248 33K
ZTP1
WIDE BAND OPTION
L27 1U5H N/F
C304 150PF N/F
C310 N/F
R410 390R N/F
L15 1U5H 10.52MHZ
C305 150PF
C311 N/F
R190 470R
C131 1U0F
TST4
R191 1K0
L16 1U5H 10.7MHZ
C306 150PF
C312 N/F
R192 470R
C132 1N0F
C153 1U0F
TST3
C283 N/F
C284 N/F
R466
R442 N/F
C154 1N0F
R193 1K0
R443 N/F
SK6
SK7
U11 TDA6160 AUDIO L.O. + MIXER + DEMOD
OSC
AF1
AF2
AF3
SDA
SCL
IF IN
IF1
IF2
IF3
+5V
R182 4K7
U2.37
SCL
U2.38
DATA
C550 330PF
C138 100NF
C137 1000UF
NOT FITTED
C156 330PF
C99
R183
L13
X12 10.75MHZ N/F
WIDE BAND OPTION
C138 22NF
R411 330R
X3 10.52MHZ
X4 10.52MHZ
R412 680R
Q111 BC8468
R184 680R
C137 220NF
C142 N/F
R185 0R0
X5 10.7MHZ
X6 10.7MHZ
R186 0R0
C139 1U0F
C140 100NF
C141 100NF
C143 N/F
R610 470R


"CLAMP"
OPTIONS
OPTION
MONO OUTPUT
3 = MONO (WIDE BAND)
2 = EXT
1 = LEFT CHANNEL
0 = STEREO (SUB CARRIER)
0 = VCR
1 = SAT
DENOTES STAR CONNECTION
CAUTION
T2


"CLAMP"
TO VIDEOCRYPT U20.7
TO VIDEOCRYPT U17
OPTION
OPTIONS
WIDE BAND OPTION
WIDE BAND OPTION NOT FITTED
MONO OUTPUT
T2
U1 TEA2018
FS1 FUSE-1AMP
SK1 MAINS INPUT 180V TO 260V
LIVE
NEUTRAL
CAUTION
6MM SAFETY BARRIER
NON FLAMMABLE



NOTE

* - NOT FITTED ON SINGLE INPUT RECEIVER. FITTED ON DUAL INPUT RECEIVER.

§ - NOT FITTED ON DUAL INPUT RECEIVER.

N/F - NOT FITTED ON EITHER RECEIVER.

CAPS 16V UNLESS OTHERWISE STATED.